VOL. 80 No. 2036
JULY 19 1958

Telephone: FLEet Street 3212 (26 Lines)
Telegrams: Allangas - Fleet - London

CHEMICAL AGE

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CONTRACT RESEARCH

THERE are only two wholly British sponsored research institutes and these have been operating for a little over 10 years. In 1947, Fulmer Research Institute was opened at Stoke Poges, Buckinghamshire, and in 1948, Sondes Place Research Institute at Dorking, Surrey. Both are independent in the sense that they have to pay their way without Government grants or subsidies; both carry out confidential 'sponsored' research; and both have continued to expand steadily since their formation.

Remarkable as is their rate of expansion it has been nothing like the very rapid growth of US institutes. The reason for this difference is that it has been necessary for these British institutes not only to sell research services, but also to create a climate of favourable opinion to this very new idea of sponsored research.

The term 'sponsored research' originated in the US where it means confidential research undertaken by an independent organisation on behalf of a sponsor who, in return for payment of the costs, retains the full and sole rights to the results of the investigation and to any patents granted. A better term would therefore be 'contract research'.

Sponsored research has grown up in the US over the last 45 years. In 1913 the Mellon Institute in Pittsburgh was founded and in 1929, the Battelle Memorial Institute. At the present time there are nine such major institutes in the US having a combined annual research expenditure of over $50 million, and a great many large consulting firms which also handle a considerable amount of sponsored research. Indeed, Battelle are now operating two European laboratories (in Geneva and Frankfurt) and several of the consulting firms also have European branch laboratories.

Sponsored research in the US has had greater success, because US industry has had a better appreciation of the value of research. A more cogent reason, however, for this wider appeal of the sponsored research organisation is likely to be the fact that the US has no research associations such as are available in this country.

Three criticisms have been levelled at sponsored research. How can a conflict of interests between sponsors be prevented? How can research be carried out satisfactorily if a sponsor has important confidential information which he is unwilling to disclose to an outside organisation? How can a small institute with a staff of 80 to 100 possibly have the technological 'know-how' and specialised knowledge necessary to tackle many diverse problems, associated with a variety of different industries?

Conflict of interests has been found to be a theoretical objection, for it is nearly always possible to foresee it before a new project is ever started. When this question was raised at the Sondes Place Research Institute's open day last Friday (see p. 105) it was learned that during the course of dealing with several thousand projects and enquiries, it has only been necessary on two occasions to turn down a new project because of conflict of interests. Where, during the course of investigation, a technique which is confidential or patentable is required the two sponsors are put in touch with each other so that satisfactory licensing arrangements can be worked out.

The second criticism is more difficult to refute. Occasionally, there is

inadverdent withholding of essential information but this is usually found to be due to inadequate liaison with the sponsor. With regard to the third objection, the answer is that the sponsored research institute sells research and development services. The organisation's 'know-how' consists in knowing how to devise and execute research and development programmes to obtain the information the sponsor requires in the quickest and most economical way. Obviously, therefore, problems outside the knowledge and experience of the staff which require years of background knowledge in the industry concerned, are not usually accepted unless there will be very close collaboration with the sponsor, should he have this knowledge, or a suitably qualified consultant can be retained as advisor.

Seemingly, sponsored research would appear to be the answer for the small firm wishing to engage in research, but the general experience both in the US and in this country is that the small firms account for a negligible proportion of the sponsored research carried out. In fact, it is found that over 90 per cent of sponsored research is for large companies with their own research laboratories or for Government departments.

What are the reasons for large companies and Government departments using sponsored research institutes? Explanations offered indicate that there is a desire to bring in an unbiased view on a problem, or that the industrial laboratory is faced with a problem outside its ken. To solve the problem, it might require engagement of a specialist scientist and additional equipment. Hence, the laboratory finds it worth while to farm out the work. Surprisingly enough, UK research institutes are undertaking some projects for US research associations and even analytical investigations. An important factor here is, of course, cost, the charge for research services being less costly than in the US. A final reason is that all industrial laboratories are becoming heavily overloaded with production problems. This means, perhaps, continual postponement of original research aimed at the development of new products or processes.

Why do small firms, who do not conduct their own research for reasons of cost and lack of facilities or trained staff, not utilise the services of a sponsored research institute or even approach DSIR establishments? It appears that the word 'research' alone scares them. Research associations of which small firms may be members report that this membership is not used to the firm's advantage. On the other hand, there are many industries which have no research associations or their fields of interest are such that membership of more than one association would be required.

Co-operative sponsored research would seem to be the answer here, a method which has gained wide acceptance in the US. It involves joint sponsorship and the sharing of results by a group of firms with common problems. A trade association could, of course, sponsor a project on behalf of its members and for each member the cost involved becomes very low.

Today, the success of the two sponsored research institutes bears witness to the belief that sponsored research provides a valuable service to industry. Demands on the services of the institutes are increasing, particularly as older establishments for applied research cannot meet the various industries' needs. The sponsored research organisations are therefore likely to have an increasingly important contribution to make to this country's industrial future.

FLUOROACETAMIDE AS SYSTEMIC INSECTICIDE

FURTHER reports on the value of fluoroacetamide as a systemic insecticide have recently been noted. Previously sodium fluoroacetate was stated by W. A. L. David and B. O. C. Gardner, Agricultural Research Council, Unit of Insect Physiology, Cambridge, to be a very effective systemic insecticide against *Aphis fabae* Scop. However, as this compound is a very dangerous poison, being both highly toxic and rapid in action, its use cannot be recommended.

Last year Dr. M. A. Phillips indicated (CHEMICAL AGE, 1957 **77,** 673) that fluoroacetamide was an active insecticide but was considerably less hazardous to handle than sodium fluoroacetate by virtue of its lower toxicity and its slower action. In a recent paper delivered at the joint meeting of the Society of Chemical Industry and the Italian Chemical Society in Turin, Dr. Phillips referred to the high order of activity of fluoroacetamide, stating that it was effective in dilutions of 1 in 10,000 parts and gave a 90 to 100 per cent kill when used as a systemic or contact insecticide. He also gave details of biological tests with white mice, noting that the LD 50 was 15 mg. per kilo body weight compared with 1 to 2 mg. per kilo body weight for sodium fluoroacetate.

Acetamide and 1-cysteine have been found to be protective substances against fluoroacetamide toxicity to mammals, a not unexpected finding in view of the suspected mode of action in relation to the tri-carboxylic acid cycle of mammalian metabolism. Sodium fluoroacetate, however, acts more rapidly in the mammalian system than does the relatively slow-acting amide; acetamide is not therefore antidotal to sodium fluoroacetate poisoning.

In order to assess the value of fluoroacetamide as a systemic insecticide, David and Gardner have carried out further biological tests.

In tests in which leaves bearing *A. fabae* and *B. brassicae* were dipped, fluoroacetamide was as effective as sodium fluoroacetate, 0.001 per cent solutions containing a wetting agent giving 100 per cent kill. Both were superior to schradan, it was reported. Leaves bearing *P. brassicae* were similarly dipped in 0.1 per cent fluoroacetamide solution and 85 per cent of eggs failed to hatch and 70 to 80 per cent of larvae were killed (*Nature,* 1958 **181,** 1810). When poured on to the soil, for systemic action against *A. fabae,* fluoroacetamide was as immediately effective and as persistent as sodium fluoroacetate: 2 mg. (in 20 ml. solution) applied to 400 gm. of moist compost giving 100 per cent kill. In this the compound proved superior to sodium fluoroacetate. Applied to *B. brassicae* and *M. persicae,* the former aphid was killed by a dose of 0.2 mg. and the latter by 1 mg. Eggs were not prevented from hatching but all young larvae were killed by a dose of 10 mg. fluoroacetamide or 20 mg. sodium fluoroacetate on the soil.

Chapman and Phillips (*Nature,* 1958 **181,** 1810) have shown, also, that a good kill was obtained on rose bush cuttings heavily infested with *Macrosiphum rosae L.* when the cuttings were dipped in solutions of fluoroacetamide having concentrations of 1 in 1,000 to 1 in 20,000. Further work has also shown that the insecticide is persistent in the rose bushes for a period of about 2 to 3 weeks, applied as spray or via root only at a strength of 1 in 10,000.

From their results David and Gardner conclude that fluoroacetamide is as effective as sodium fluoroacetate. The question of whether or not it would be safe to use fluoroacetamide on food crops now remains. Residue tests on fluoroacetamide-treated sugar beet and cabbage by Dr. Phillips indicate that the forbidden period for these plants is of the order of 4 to 6 weeks; the toxic residue is then stated to be insufficient to affect in any way experimental animals over a period of 60 to 90 days.

RESEARCH AT SONDES PLACE

New Work Seen at Open Day

IT was a pleasure to see wonderful experiments going on under private enterprise, stated Sir George Thomson, Master of Corpus Christi College, Cambridge, when he addressed visitors at the Open Day at Sondes Place Research Institute. The occasion was the commemoration of the institute's 10th anniversary as an organisation undertaking sponsored research and development in chemistry, chemical engineering and mechanical engineering.

The institute developed from a consulting and chemical engineering practice which was founded in London in 1936 and incorporated into a limited company in June 1947. With the acquisition of premises on the outskirts of Dorking, new laboratories were opened in June 1948. During the 10 years of its existence, the organisation has achieved a steady growth and its scope and facilities have been extended.

Sir George, in his address said that there was a queer connection between war and research. After the war, there was more research carried out. Since World War II there had been a greater employment of physicists and mathematicians. In fact, the mathematician was now no longer 'a rare bird' in industry.

UK Research Spending

The expenditure on research in this country was 2 per cent. This was the average reasonable amount so spent, but in any one industry there was no constant for research. Referring to small firms, Sir George said that these might feel that research was beyond them. The small company, for one thing, had difficulty in attracting the brilliant young man. To-day it was necessary for teams to work on research problems, but he opined that it was the leader of such teams who really mattered. A committee had never written a successful sonnet, so he was sure that research was still as individual as the writing of poetry. In the UK, there was Government research, DSIR and sponsored research. Compared with the US, however, sponsored research was relatively undeveloped. Sondes Place was most important for this kind of research. It was interesting to note that the great bulk of sponsored research work came from large firms and Government departments.

The object of Sondes Place Research Institute is to carry out sponsored research and development in chemistry, chemical engineering and mechanical engineering. Confidential work is undertaken on a contract basis and all results and patent rights arising from a particular project belong exclusively to the sponsor. The institute aims, in fact, at providing a comprehensive range of services including technical and economic assessment of projects, laboratory research, pilot-plant development, and the design of full-scale plant. It is, in fact, a flexible organisation capable of applying basic scientific knowledge to a solution of the practical problems of widely different industries and hence covers a very broad variety of products and processes.

Dr. H. H. Chambers, the Institute's director of research, welcoming Sir Harold Hartley. Left, Sir George Thomson

Visitors at the open day anniversary were able to gain an insight into the activities of the institute. Unfortunately not all the work being undertaken could be viewed and many interesting aspects of experiments being conducted could not be fully explored as the work undertaken was confidential.

Ion-exchange membranes: One laboratory is devoted to research into ion-exchange membranes, a project which is being sponsored by the National Research Development Corporation (NRDC) and is part of a joint NRDC/DSIR programme aimed at developing new and improved ion-exchange membranes and equipment for industrial applications of electrodialysis (see also Chemical Research Laboratories annual report 1957—CHEMICAL AGE, 5 July, p. 15).

Work is proceeding at the institute in collaboration with the Chemical Research Laboratory and the Low Temperature Research Station, Cambridge, on two main problems: development of new membranes and methods of making them on a large scale: and operation of pilot electrodialysis units and investigation of the chemical engineering problems of using electrodialysis for purification in the industrial fields. An economic aspect of the electrodialysis process is that it is continuous and requires no 'shut-down' period for regeneration. With conventional ion-exchange, the columns gradually become saturated with impurities and ultimately have to be regenerated before further use. Research at Sondes Place is aimed at finding an all-purpose membrane. Specimens of anion and cation exchange membranes were exhibited and of some p.v.c. membranes. A homogenous membrane of p.v.c. has been prepared, which is stated to be very much cheaper than existing membranes, the cost being 5s per sq. ft. against 25s per sq. ft. for other membranes.

Suitable applications for electrodialysis are being examined. One possibility which appeared to be under consideration is the value of electrodialysis for pickle liquor and waste ferrous sulphate solution.

A single-stage pilot electrodialysis unit was shown in operation and also a three-stage unit with control mechanisms. The single-stage unit, it is understood, would treat brackish water (5 or 6 p.p.m.). The three-stage unit may find an application in the beet-sugar industry for liquors from sugar production, and in pharmaceutical liquors.

High temperature materials: Main studies in this section are diffusion processes for producing coatings on metals resistant to oxidation at very high temperatures. There is also the possibility that such coatings will provide wear resistance also. A hard-chrome plating has been developed for wear-resistance in titanium. Work on molybdenum is based on the prevention of high temperature oxidation of the metal. Protection of molybdenum wire has been accomplished which has withstood a temperature of 1200°C for 3,600 hours.

Vapour plating processes such as siliconising, chromising and boronising were demonstrated, together with test methods on oxidation resistance, thermal shock resistance and wear resistance.

A self-baking electrode was shown in this section. Generally, an anthracite-pitch mixture is used for these. A recent problem presented to the institute by Powell-Duffryn Ltd., on behalf of a Rhodesian chrome smelter, was the possibility of using indigenous material, particularly coke. A consideration in Rhodesian chrome smelting was that power was cheap, particularly at night (1d a unit). A coke and pitch electrode was formulated which under test took 1,200 amperes as against the expected 300 amperes. Electrodes of 90 inches

diameter can be produced. The coke/pitch electrode, it is suggested, may find an application in alumina smelting.

Sugar as a chemical raw material: A project sponsored by the Sugar Research Foundation, New York, is a pre-pilot plant study of the reductive aminolysis of sugar. The object is to study the reaction between hydrogen, ammonia and sugar at high pressures in the presence of a catalyst and to assess the potential market value of the products. If successful, it will lead to a full pilot-plant investigation of the reaction.

Dr. F. A. Freeth, a director of the institute, in conversation with Sir Henry Tizard

Work to date has shown that the sugar molecule is completely disrupted and considerable amounts of nitrogen introduced give compounds such as primary diamines (ethylene and propylene diammine), piperazine and substituted piperazines, ethanolamine, pyrols, etc.

The complex reaction product has so far resisted complete resolution by ordinary methods such as fractional distillation and selective solvent extraction, but very satisfactory gas chromatographic techniques have been developed here for rapid analysis. Some of the products have potential value as intermediates in the preparation of polymers, synthetic fibres, surfactants and chelating agents.

Fuel Cells: Research on fuel cells is being sponsored by the Ministry of Power, with the object of developing primary batteries for converting the chemical energy of fuel directly into electrical energy without employing a heat engine. The chemical reaction used is the oxidation of fuel to carbon dioxide and water. Compared with power producing plant employing a thermal cycle which is limited by purely theoretical considerations to about 38 or 40 per cent, the fuel cell has no such limitations. They are able to convert the whole of free energy of oxidation of the fuel into electrical energy and in practice thermal efficiencies of 50 and 80 per cent have been obtained.

It is unlikely that fuel cells would be used for large-scale power generation, their most likely uses being as follows: small power producing units (the absence of moving parts is attractive); transport fuel cell batteries coupled to electric motors and running on compressed gas or vaporised liquid fuel; generation of low voltage direct current for electrochemical processes; and utilisation of waste combustible gases, especially low-grade gases (ex refineries, for instance) with low calorific values. Small single cells were demonstrated. These run successfully on carbon monoxide, hydrogen, producer gas, town gas and any vaporised liquid fuel such as kerosene or petrol. With industrial gases the temperature range is 450° to 800°C. The electrolyte is fused alkali carbonates (eg. Li/Na carbonates). The open circuit voltage is $\triangleq$ 1.2 volts/cell; current density at 0.75 volts $\triangleq$ 60 amps/sq. ft.

Fuels cell developed so far at Sondes Place have had a life of eight months. The aim is, of course, infinite life for a cell. Present cells operate just as long as metals will withstand temperature changes and corrosion. Present difficulties involve prevention of mechanical failure, thermal shock and the coating peeling off the electrodes.

The need is now to build a self-sustaining cell, since the laboratory units do not produce enough heat (i.e. 500° to 700°C). Since an output of 2 to 3 kilowatts would be self-sustaining, a large cell with an output of between 2½ and 5 kilowatts is under development. The cell would be short-circuited to the desired operating temperature (450° C).

Porous Ceramics

Ancillary problems involved in fuel cell research include the preparation of porous ceramics (for electrodes) and measurement of electrical conductivity of solid electrolytes. Channelled electrodes are sprayed with coarse then fine-ground material for control of pressure. Placed between the channelled electrode holders are discs. In the preparation of these discs there is need for strength and high porosity (50 to 60 per cent). Powdered magnesia is being used, which is pressed and fired at 1300° C in a Crusilite furnace, built by the department to the design of the Morgan Crucible Co. The furnace utilises Crusilite heating rods, and has a usual temperature of 1,350°C, but can have an occasional temperature of 1400°C.

Pilot-plant projects: Dorr-Oliver Ltd., have a Dorr-Oliver FluoSolids pilot plant at Sondes Place for investigating reactions in fluidised solid beds at elevated temperatures (see CHEMICAL AGE, 28 June, p. 1196). Several projects for several clients, it is understood, are being investigated. Of particular interest is the application of the FluoSolids process for waste metallic sulphides obtained by smelting companies. This material would be decomposed in the kiln to give sulphur dioxide and so form a source for acid production. It is known that Dorr-Oliver are conducting a considerable amount of research in fluidised techniques with the following objectives: roasting of arsenopyrites to yield a calcine containing less than 0.06 per cent arsenic with copper, zinc, lead and other impurities readily removable by further treatment; to provide more data on the operating conditions required for controlling the acid and water soluble content of calcines obtained from roasting copper concentrates; the controlled reduction of Fe_2O_3 to Fe_3O_4; and that of iron ore to metallic sponge iron.

Another pilot-plant study noted was that of an ammonia liquor reactor for removal of hydrogen sulphide, for Edward Webb (Stourbridge). The liquor (e.g. ammoniacal gasworks liquor—which to-day is proving such an embarrassment to gasworks) is pumped under 500 p.s.i. into an air column. The operation is a quick continuous one, compared with the batch method now employed.

It is believed that this problem is being tackled more as a fundamental one. It is hoped that by removing hydrogen sulphide from ammoniacal liquor a credit will be obtained such as possibly the formation of ammonium sulphate. Pilot trials are therefore being conducted with and without catalysts, and under varying temperatures and pressures.

Chemical generation of hydrogen: A high-pressure unit for chemical generation of hydrogen was shown. Magnesia pellets are the charge in a perforated cylinder and steam is passed through. The hydrogen is evolved under pressure (100 atmospheres) and goes straight into cylinders. It is understood that this work is being done for an Admiralty department, who are interested in this method of generating hydrogen for filling meteorological balloons.

Fertiliser Granulation pilot-plant: This plant has been built to study the problem of granulating compound fertilisers as part of a co-operative research programme sponsored by Edward Webb (Stourbridge) Ltd., Lawes Chemical Co. Ltd., and Anderton-Richardson Fertilisers Ltd. This study is stated to be very successful.

Cross-Linked Polymers

Now in the third stage of development is a project, sponsored by Peterlite Products Ltd. The name Peterlite covers a range of cross-linked co-polymers, each one formulated to have the optimum physical properties for particular application. All are claimed to be completely non-crazing. Other properties of these plastics materials are heat resistance, chemical resistance and abrasive resistance. All except one (Timelite) are two-stage thermo-setting materials. They are produced initially as thermoplastic sheets, rods, etc., which can be moulded or vacuum-formed to shape and then cured to a fully thermo-set condition.

Materials in the Peterlite range are as follows: Avialite—heat resistance up to 150°C and excellent chemical and mechanical properties; New Metralite—heat resistance up to 125° C. and excellent chemical resistance; Focalite—special grade with great scratch-resistance for optical purposes (eg. moulded lenses); Spectralite—the hardest and most scratch-resistant grade for optical use; and Timelite—an improved non-crazing thermoplastic.

The monomers are produced in three 100-gall. stainless steel units by vacuum distillation. The pilot-plant has not, however, run to full capacity. Few production problems have been found. The problems which are engaging the Peterlite investigators are those connected with casting.

TO CALL RIGIDEX 'POLYTHENE' WOULD BE MISDESCRIPTION

More Views in Polyethylene Controversy

SIR, We would like to ask you to help to clear away some of the fog that is obscuring the polythene/polyethylene discussion. This is, to establish once and for all that 'polyethylene' is a correct description, from a chemist's point of view, of the material under discussion (cf. polyvinyl chloride, polypropylene, etc., which no one ever questions). This could be done by obtaining and publishing the opinion of two or three impartial leading British chemists.

Once that is established, it will be easy for people to appreciate that the word 'polythene' for the same material is a coined word.

From this point, it is reasonable to argue that such a coined word—widely publicised in trade and industry primarily by the one company producing both the material and the word—is in effect a trade name. Incidentally it is not surprising that your vote was 134 to 58 in its favour, considering the years of publicity it has received. What is surprising is that after only a few months publicity, the forgotten 'polyethylene' should have attracted over one-third of the votes.

Whether 'polythene' is a near trade name or not, there is no doubt whatever that this term is directly associated in everyone's mind with the one British company producing conventional polyethylene. It is in effect synonymous with that company's material.

No Polythene 'Poaching'

Once this is agreed, it raises two very important points. First, it is not usual for any large company to infringe another's trade mark. Nor would such a company wish to poach, or even to appear to poach, upon the legitimate territory of another company by using a 'trade word' or 'trade description' widely used by that other company to describe its own products.

We consider that this is quite sufficient reason for using the word polyethylene, not polythene, for describing Rigidex.

But besides this, we have a second reason for adopting the plain straightforward chemical term polyethylene. Leaving aside the 'trade word' aspect and considering only the aspect of molecular/physical properties, we believe that the term 'polythene' is strongly associated in everyone's mind with just one type of polyethylene—low-density, low-melting point material. Rigidex polyethylene is different in that it is a new high-density high-melting point material—points that we wish to stress. To describe Rigidex as 'polythene' could therefore be regarded as a misdescription.

Thus polyethylene, an uncommitted unemotional chemical term, is an umbrella under which all forms of polymerised ethylene can live and compete on equal terms.

In conclusion, may we add that views similar to these are held, to our knowledge, by other British companies in the polyethylene field as well as, of course, by producers and users in most other parts of the world.

Yours, etc.,
G. C. GRAVER.
Publicity and Information Manager.
British Resin Products Ltd.,
Devonshire House, London W1.

Decision Applauded

SIR, I am very pleased to see the result of the ballot which you held at the Chemical and Petroleum Engineering Exhibition at Olympia, as also the very interesting letters which you have published on the polythene/polyethylene controversy. It is now abundantly clear in which direction the weight of public opinion falls, and I applaud your decision to stick to 'polythene'.

After all, in this country we are not 'crackers' enough to describe all biscuits as crackers.

Yours, etc.,
J. V. CROSSLEY.
Home Sales Director.
ICI Plastics Division,
Welwyn Garden City, Herts.

Another ICI Vote for Polythene

SIR, Please record one vote in favour of the word in its shortest form, 'polythene'. Apart from brevity this form has the distinction of being the original and what better reason is there than 'for the sake of auld lang syne'?

Polythene—
Has always been
A neat portmanteau word;
So why add 'e'
And 'y' and 'l'
For another, more absurd?

The polymers of ethylene
Have caused a namely schism,
But the choice of name
Must be the same
As at their first baptism.

So polythene it was and is,
And evermore shall be,
And of dissension may the name
Of polythene be free!

Anna Polly Gee

Yours, etc.,
R. M. WARD.
ICI Glasgow Sales Office,
4 Blythswood Square, Glasgow C2.

'Give Polythene its Proper Name'

SIR, Offhand, to me and probably to many other unbiased polymer chemists, a polythene would be a product made up of many 'thenes'.

Thus, the term polythene may be OK as a trade name which, anyhow, most of the time is neither meant to say what it means, nor to mean what it says. However, since it is by now too late to hide the fact that the product in question is made, one way or the other, by the polymerisation of ethylene, I see no reason why one should not give it its proper name.

Nevertheless, I realise that the popular vote on this subject may well turn in favour of polythene, tradition being a strong factor. In this case, the least I can ask is that the same terminology be applied consistently to all other 'polypounds' as well. The more I think it over, I must then almost insist that polypropylene be called polypylene, leaving it up to a special committee to adjust the nomenclature for all other 'polers' and particularly the polyfins.

Trying to be open-minded in all things scientific, I must admit that I see at least one advantage in this novel nomenclature: polymethylene will then also have to be called polythene, which might prevent the smouldering controversy over polymethylene versus polyethylene to erupt into another popular vote.

Yours, etc.,
R. RAFF.
5732 Brinley Drive,
Verona, Pa., US.

AEA to Abandon Windscale Plutonium Pile

THE Atomic Energy Authority have decided to abandon the first plutonium pile at Windscale (see CHEMICAL AGE, 12 July, p. 55). Some of the equipment from the pile will be removed, the most probable pieces being instruments installed for measurement of temperature. The concrete box enclosing the reactor will then be sealed up and left until the radioactivity inside has decayed (a process likely to take a century or more). Future of the No. 2 pile has not yet been settled.

It is hoped that work will start this autumn on the building of the advanced gas-cooled reactor. The authority also indicate that building of a second and larger fuel processing plant cannot be delayed much after the beginning of next year.

B. & T. Plan Gas Chromatography Range

COMPLETE ranges of new gas chromatography and electrophoresis equipment is being planned by Baird and Tatlock (London) Ltd., Freshwater Road, Chadwell Heath, Essex, for production before the end of 1958.

These will include tanks, ovens, fraction collectors, power packs, etc., and probably a new gas chromatographic instrument for routine analyses under commercial conditions.

It is understood that details of the new products will be announced in the early autumn.

Courtauld's Russian Deal

Courtaulds Ltd. have concluded a contract worth several million pounds with Technopromimport, Moscow, to supply machinery for a textile factory in Russia. This factory will manufacture cellulose acetate yarn from Russian-made raw materials.

Responsibility for supervising the erection of machinery and for putting the factory into production will be undertaken by Courtaulds.

★ A RADIOACTIVE tracer technique is used at the Laundry Trade Exhibition (Olympia, 17-26 July), by Albright and Wilson to demonstrate their Calgon water conditioner as a means of overcoming the 'lime-soap bogey.' It shows how Calgon added to conventional wash liquors helps kill residual lime-soap deposits that, claim the company, remain on laundered goods even when fully softened water is used.

A geiger counter head connected to an amplifier gives the radioactivity count for three test switches of cambric soiled with radioactive lime-soap. Minimum count per second is only achieved when Calgon is used in the wash.

Other demonstrations emphasise the lime-soap theme. A major claim is that even in carefully softened water, considerable hardness and lime-soap is introduced by the soiled laundry itself. At one laundry, after blankets had been washed in detergent in process water with nil hardness, the spent liquor was found to contain 8 degrees of hardness.

★ BECAUSE the Norwich factory of May and Baker is on a seven-day week, it was not possible to arrange an official party to attend the company's 'family day' at Dagenham recently. Their places were taken by pigeons!

With the aid of Norwich fanciers, as many pigeons as there are employees were released from the M and B Dagenham sports ground. The employee whose name was carried by the first pigeon to return to its Norwich loft was awarded a prize.

Other events in the family day programme were a fork-lift truck contest, a miniature circus and a judo display.

★ THE WORLD'S first offshore sulphur mining plant is beginning to take shape with the erection of the first steel towers seven miles off the coast of Louisiana in the Gulf of Mexico. When completed, the Y-shaped island will stretch for nearly a mile and reach 60 ft. above the water. The structure, believed to be the largest steel island in the world, is the principal part of a $30 million project undertaken by Freeport Sulphur to develop a major new sulphur deposit known as Grand Isle.

Five large and 10 smaller steel-pile towers, connected by 200-foot-long bridge spans, will form the structure. This will support the complex and heavy facilities required by the Frasch process. The large towers will support the major installations—the seawater heating plant, three drilling platforms, and the living quarters and recreational area. A total of 250 men will work five-day-on, five-day-off shifts and will be transported to and from the island by helicopters.

The heating plant will use 13 million cu. ft. of gas to heat 5 million galls. of seawater a day to 325° F for injection into the underground formation through wells. It will also compress large volumes of air used to air-lift the liquid sulphur to the surface, and produce electric power to operate drilling rigs and other equipment. The plant will use a patented process, developed by Freeport, which makes it possible to heat the required vast quantities of seawater with a minimum of corrosion and scaling.

The mine, expected to be in production in 1960, will be one of the largest sulphur mining operations in the world.

★ THIS SUMMER many chemists will be crossing the channel for their holidays. Those travelling through or staying in north-west France will be interested to know that Ernest Benn (associated with Benn Brothers, publishers of CHEMICAL AGE) have recently issued a new edition of Muirhead's 'Blue Guide to North-Western France.'

Though Ernest Benn's book list is extraordinarily varied, it is not often that they publish a volume of immediate appeal to the President of the US. But this new edition certainly fills the bill. If it was not for the efforts of General Eisenhower in 1944 the book might not have been written.

The office of the President has sent a special message expressing the President's appreciation of the copy sent to him. Another copy was sent to Lord Montgomery, who through his military assistant at SHAPE, has also expressed his pleasure at the gift.

★ UP 2,000 per cent—that's the increase in work study staff employed by ICI in the UK over the past 10 years. With 60 members a decade ago, the staff now totals 1,400. At one-day appreciation meetings, ICI work study specialists advise not only industrialists from other companies, but also Cabinet Ministers, officers of the Armed Services, trades union leaders and officials of all kinds. Representatives from most European countries have, at one time or another since 1953, attended these meetings at the London headquarters.

Late in July this 'service' will be extended still further: three senior members of the department are to travel to Jamaica and Trinidad to talk to top management executives there. The team will consist of Mr. Russell Currie, C.B.E., department head, Mr. J. B. Kitchin, deputy head, and Mr. P. J. Torrie, head of the training section. (See picture in page 119.)

ICI themselves have found that work study can be successfully applied to many more operations than was at first thought. The techniques have been applied recently to the construction of plants, to farming methods, transport, mining, and office routine as well as repetitive work.

★ MR. KRUSHCHEV seems to be taking a keen interest in the chemical industry. His latest massive offer has been in connection with the Soviet programme to enable the East German regime to overtake West Germany in personal consumption by 1961. With Russian assistance, production in the chemical, metal and light industries is to be increased by about 2,000 million marks from 1959 to 1960.

In the third five-year-plan (1961-65) efforts will be concentrated mainly in the chemical industry. The manufacture of artificial fertilisers is to be raised by 250 per cent; East Germany will in that period begin to produce her own oil.

Perhaps the offer, announced on 10 July at the congress of the East German Socialist Unity Party, is a sop for the dismissal on the day before of Herr Horst Willim, chairman of the East German chemical industry trade union. Along with several members of the secretariat he was sacked for 'lack of ideological clarity.'

★ LATEST development in closed-circuit TV is a mechanical 'hand' with a television 'eye' developed by the UK Atomic Energy Authority to remove spent radioactive cartridges from inside atomic piles of the Windscale type. In this type of reactor, the cartridges are discharged from the graphite moderator and when spent fall into a 'discharge void' between the discharge face and the concrete outer casing. From this space they are removed for disposal.

Not all the uranium cartridges fall into the discharge void, some lodging on the arms of a burst cartridge detection scanner or on ledges on the pile face. Some can be removed or dislodged with tools inserted through inspection holes, but some can lay in concealed positions not visible from the holes. Since unlocated cartridges are a hazard to safe operation, it is important that they be speedily detected.

The new device will be used after each discharging. A boom carrying the camera is lowered through one of the access holes in the top of the pile and systematically searches the face. The boom, which also carries the grab and light, has rotary and lateral movement. Operation is controlled from a derrick head that houses the viewing monitor, TV control unit, position indicating dials, self-winding cable drums and hoist.

Marconi's Wireless Telegraph Co., Chelmsford, supplied the TV channel (the new Marconi type BD781 vidicon), while the machine was made by Sir W. G. Armstrong Whitworth Aircraft to AEA design.

Alembic

Toxic Substances in Atmosphere

Midlands SAC Members Discuss Methods of Determination

THERE could be little doubt that chemical contamination of factory atmospheres was one of the most important factors contributing to industrial disease, said Dr. J. C. Gage (Imperial Chemical Industries Ltd., Industrial Hygiene Laboratories) at a recent meeting of the Midlands Section of the Society for Analytical Chemistry in Birmingham. He was opening a discussion on 'The determination of toxic substances in the atmosphere'.

Although attack of chemical substances on the skin might cause a greater amount of lost time in industry, industrial dermatitis could be readily recognised and usually effectively prevented or treated. Inhalation of toxic substances in large doses, however, might be catastrophic and possibly fatal, while repeated absorption of small amounts might give rise to diseases with a high degree of chronicity.

Dangers of Delayed Action Gases

A toxic substance, taken into the lungs, exerted its effect either by being absorbed into the general circulation or by direct action on lung tissue. So-called lung irritant gases, e.g. chlorine and phosgene, probably reacted chemically with cell proteins, leading to oedema and haemorrhage. The most dangerous gases and vapours, however, were those whose action was delayed and which entered the lungs unheralded by a marked irritant action or powerful odour, e.g. carbon monoxide.

Investigations into toxic action of dusts had been dominated by fibrotic changes produced in the lungs by dusts containing silica, attention being focussed on particles of 5μ or less. There was a tendency to ignore particles greater than this because they were trapped in the nasal passages. Nevertheless, many chemical dusts might exert an action either by being absorbed through the nasal mucosa, or by being swallowed with mucus. Dusts and mists might also produce local effects on the upper respiratory tract.

Lists of atmospheric concentrations, representing figures not to be exceeded in localities where men were regularly working, had been prepared in many countries. Best known were the threshold limits issued annually by American Conference of Governmental Industrial Hygienists. The limits should be used as guides in control of health hazards and should not be regarded as fine lines between safe and dangerous concentrations. Information on which threshold concentrations were based was invariably incomplete, and might on occasion be of doubtful validity or contradictory. It was not surprising, therefore, that with certain air contaminants, there were wide variations in figures accepted in different countries.

Limiting concentrations for industrial atmospheric contaminants had been widely referred to in English-speaking countries as *maximal allowable concentrations*. They had performed a useful function in interpreting results of chemical analyses undertaken to maintain satisfactory working conditions or confirm diagnosis of industrial poisoning. In spite of these obvious advantages, much objection had centred round the term 'allowable'; not only was it considered improper to give a legal connotation to such indefinite figures, but it had also been held morally indefensible to allow a concentration of any magnitude in view of slenderness of evidence on which figures were based. So long as such allowed concentrations existed, they might be misinterpreted by those not fully informed on their nature and there would be no stimulus to design and operate a plant where concentration in the atmosphere would approach the ideal value of zero. Attempts had been made to overcome objection by suggesting alternative terms, e.g. maximal acceptable concentration, threshold limit, air hygienic standard, design concentration.

Significance of Threshold Concentrations

For the analyst engaged in determination of a toxic substance in the atmosphere, threshold concentrations had an additional significance; they enabled him to select a method of adequate sensitivity. By selection of a sufficiently insensitive method, an analyst could make almost any atmospheric concentration yield results of negligible significance. If, however, he was provided with a figure at which to aim, a method could be devised capable of giving a meaningful answer at that level. The nature of experimental evidence on which threshold limits were based indicated that it was inappropriate for the analyst to aim at a high degree of precision in his selected method. A deviation in result of up to 20 per cent would not make the method unacceptable.

Concentration of a toxic substance in an industrial atmosphere could not be completely defined by means of a single figure, for it would vary in space and time. Design of a procedure for testing an atmosphere must, therefore, be considered with care. A decision must be reached on where, when, how often and for how long tests should be made. The person undertaking or directing the investigation must make himself fully familiar with nature of the manufacturing process, positions of highest risk, movements of process and maintenance, operators and air currents of the ventilation system; he must then so apply his specialised knowledge and common sense that tests gave, with minimal expenditure of time and effort, a reliable picture of hazard from the atmospheric contaminant.

Variable nature of an industrial atmosphere might be investigated by a series of short term tests, each taking not more than a few minutes. Samples should be taken at suitable sites, at selected periods, during course of the working day. Some authorities preferred, however, a test of longer duration, lasting perhaps the whole of the working shift; with very low concentrations this procedure might be necessary, and it had practical advantages although integration of a possibly widely fluctuating concentration might be open to criticism on toxicological grounds. It had been suggested that the investigator, with his sampling equipment, should accompany the worker as he followed his employment or that apparatus for taking a continuous air sample should be attached to the worker.

Routine Air Control Should be Simple

An analytical method suitable for routine air control should provide an answer with as little delay as possible. Furthermore, the test should be sufficiently simple to permit operation by a foreman or assistant with little or no analytical training, so avoiding demands on time of a skilled analyst. This consideration discouraged use of procedures such as titration or weighing, and most methods, in practice, involved recognition or measurement of a colour change.

Although simplicity of operation was very desirable, it should not be achieved too much at expense of specificity and precision. It was, of course, preferable that the method should be unaffected by presence of other substances in the atmosphere. It was rarely necessary for results to be obtained with a high degree of precision, but it was essential that the acceptable level of precision should be attainable at maximal allowable concentration, however low this figure might be. It was, therefore, necessary to select an analytical procedure of adequate sensitivity, which might, if necessary, be achieved by collection of a large air sample. Requirements of simplicity, accompanied by high sensitivity and specificity, might sometimes be met by use of instrumental methods, many of which gave, unattended, a direct indication or permanent record of atmospheric concentrations.

Apparatus to withdraw the air sample had to conform with conditions imposed by sample volume required, speed of sampling, availability of services and possibility of a fire or explosion hazard. The method used might either provide

Determining Toxic Substances in the Atmosphere—cont'd

a positive measure of volume collected, e.g. hand pump, evacuated vessel and water aspirator, or a continuous sample might be collected by a pump provided with a means of flow control and measurement. Integrating gas meters were of limited value. For large air samples, greater than 10 litres, some form of continuous pump was usually necessary, although a reversible aspirator had been developed for this purpose. The most convenient form of flow meter for high sampling speeds was the Rotameter gauge, but more attention might well be given to use of critical orifice plates. These maintained flow at a constant figure, provided that pressure on the high pressure side of the orifice did not vary. A very convenient pump, operated manually by crank, had recently become available; this was provided with a vacuum stabiliser and was suitable for sampling speeds of up to 3 litres per minute.

A common method of removing a toxic substance from an air sample was to bubble the latter through a liquid, which might trap the gas or vapour either by simple solution or by chemical reaction.

When a simple solution was involved, efficiency of absorption, the fraction of substance in the air sample retained by a single bubbler, was given by:

$$E_V = v/VK\ (1 - e^{-VK/v})$$

where v represented volume of liquid, V represented volume of air sample, and K was a constant depending on volatility of the vapour or gas from solution. Thus, the more volatile the vapour, the lower the efficiency, while by keeping the volume of air sample small or of liquid large, efficiency could be improved. The equation contained no term for speed of sampling, and provided that very high speeds were not involved, little advantage in efficiency was to be gained by slower sampling. An increased efficiency could, however, be obtained by using several absorbers in series; it was rare that more than two such absorbers were necessary.

Complete Absorption of Vapour in Liquid

Complete absorption of vapour in a liquid might be possible if chemical reaction was involved in retention of the vapour, provided that time of reaction was short compared with period of contact between air and liquid. Many methods based on this principle and in common use, e.g. absorption of chlorine in o-tolidine solution or aniline in dilute acid, involved reactions so rapid that efficiency was unaffected by range of sampling speeds usually employed. Slow chemical reactions were unsuitable for bubbler absorbers and if they had to be used, one must consider some other method of absorption, e.g. the exhausted vessel used for nitrous fumes by the diazotisation procedure. For the few reactions, efficiency of which was affected by design of absorber, most useful modification of the simple bubbler was probably inclusion of a sintered glass disc to break up the air and reduce bubble size.

When the atmospheric contaminant existed as a mist, dust or fume, and a weight concentration in air was required, certain important modifications were necessary in design of a bubbler. Particulate matter might not be trapped efficiently by bubbling air through a liquid if the size range was such that the mean free path of the particles was insufficient to permit a high proportion of collisions with the bubble surface. Dimensions of absorber and air sampling speed should be such that air at the jet approached sonic velocity, then impinged on the base of the absorber. Such an absorber was known as an impinger and efficiency of retention depended on the sudden change in kinetic energy of the particles.

Impregnation of Paper with a Reagent

Department of Scientific and Industrial Research, and subsequently Ministry of Labour Factory Department, had introduced an absorber based on impregnation of paper with a reagent which produced a coloured stain when air under test was drawn through it. The stain was compared with a standard chart to assess atmospheric concentration of toxicant. This method was very simple and might be operated by relatively unskilled labour. A more recent development had been the indicator tube absorber; this was a glass tube filled with granular material which underwent a colour change when contaminated air was drawn through it. Assessment of atmospheric concentration of toxicant might be made either by measuring volume of air required to change completely the colour of the reaction layer, or by comparing the colour produced on the reaction layer with a series of standard colours, or length of the coloured layer might progressively increase with concentration of contaminant which was determined by applying the length of the stain to some form of calibration chart. A range of such tubes was available commercially in several countries, but their reliability depended on methods used by makers for calibration and stability trials.

Chemical methods alone were usually inadequate to assess potential hazard from dusts giving rise to pneumoconiosis. Toxic action of these dusts was exerted in the lung alveoli, and it was important that the analytical method used to determine their concentration should indicate number of particles per unit volume sufficiently small to penetrate into the lung alveoli, and not so small as to be innocuous by virtue of poor retention or rapid elimination, or for some other reason. Unless particle size distribution of the dust was accurately known, a chemical or other method which submitted its results in terms of a total weight concentration, would not provide this necessary information. It was current belief that only particles less than about 5μ were capable of reaching the lung alveoli. There was less agreement about the lower size limit; a considerable portion of the finest particles were not trapped in the virtually stagnant conditions in the alveoli and were exhaled. In silicosis, by far the most important pneumoconiosis, there was some indication that very fine particles had a lower toxic action, due possibly to more rapid solution and elimination.

If a sufficiently large sample of dust could be collected, distribution of weights in appropriate size ranges might be determined by a suitable classification procedure, and from this, the number of particles in each range might be calculated. Such a procedure had the advantage that the fractions might be subjected to a chemical analysis if desired. The dust sample might be collected by filtration through a soxhlet thimble or by means of an electrostatic precipitator, from which it was washed with water or other liquid in which it was insoluble and in which it readily dispersed. The suspension was then separated in fractions by elutriation, the fractions being subsequently dried and weighed. Alternatively, a separation of all particles below about 5μ might be achieved by an air elutriator situated in front of the filter.

In order to obtain a sufficiently large sample of dust for weight distribution analysis, a sampling period of several hours was usually necessary. Much smaller samples were required when distribution of particles was to be determined by counting under the microscope. Several methods of collecting the dust sample were available for this purpose; in the US the midget impinger had been widely used, while in Great Britain most investigators in recent years had preferred the thermal precipitator. Comparative studies had shown that the latter was more efficient in trapping smaller particles and less likely to fracture larger aggregates. For the microscope count, a measured volume of suspension from the impinger was suitably mounted, while with the thermal precipitator, dust was examined on the coverslip on which it was deposited. A recently introduced method of considerable promise consisted of sampling the air through a membrane or Millipore filter made of cellulose acetate, which might be rendered transparent by means of a liquid with a suitable refractive index. Particles were then counted by direct viewing under the microscope.

Indian Orders for ICI

Orders for 30,000 tons of solid caustic soda and 12,000 tons of light caustic soda have been placed with Imperial Chemical Industries and with suppliers in China, by the State Trading Corporation, New Delhi.

COAL TAR RESEARCH PROGRESS

Leeds Association's World Wide Review of Technical Developments

INFORMATION of interest contained in the July–December 1957 'Review of Coal Tar Technology' (Volume IX, Part 2) is recorded below. The review is published by the Coal Tar Research Association, Oxford Road, Gomersal, Leeds (price to non-members of CTRA 10s).

Coal tar distillation: Various aspects of tar distillation have been studied in Russia. Full-scale tests of the effect of steam on the continuous distillation of tar show that 2 per cent of steam increases the yield of total distillate but reduces the content of lower boiling products such as naphthalene, phenols and bases, probably as a result of reduced fractionation efficiency. Studies of fractionation in a two-column still, with particular regard to the distribution of naphthalene, showed that reducing the number of trays from 5 to 3 in the feed section had no ill effect, while an increase from 11 to 15 trays in the next section gave 6 per cent greater efficiency. An increase from 37 to 43 plates in a pipe still column allowed the production of an 80 per cent naphthalene oil from which could be recovered naphthalene of 79.0°C to 79.2°C crystallising point in a 64 per cent yield on that available from tar.

BASF Process Proved

Primary fractions: The claim that the BASF process for hydrorefining of crude benzoles gives higher yields than those of the acid refining method has been confirmed at the Koppers plant at Frankfurt which has been operating since 1956.

It is reported that a continuous sulphuric acid wash has been adopted in preference to pressure refining at the new Rheinelbe Bergbau AG plant, as it is considered that the plant costs are appreciably lower and that production of pure products is easier. Though the yield of benzole is lower than that obtained by hydrorefining, the total revenue arising from the sales of special products such as dicyclopentadiene and other resins is stated to be higher.

A three-column unit for separation of pure benzene and toluene has been described by a Russian worker. An intermediate thiophen fraction is removed by the second column. Corrosion of benzole distillation columns would be reduced, it has been reported, by placing the scrubber for hydrogen sulphide before the benzole extraction unit. It has been suggested that the vapour/oil mixture from the regenerator could be washed with water and passed through metal turnings before entering the column, in order to remove the chlorine, cyanogen and hydrogen sulphide released during regeneration of the absorbing oil.

Use of the aluminium chloride/hydrocarbon complex to effect desulphurisation of a crude benzole, the catalyst being used five or six times, has been described. At 70°C, 38 to 57 per cent of the sulphur compounds were removed and the bromine number was reduced from 0.4 to 0.04–0.1.

Tar acids: US Patent 2,760,991. (California Research Corporation) describes a method of preparation of phenols direct from aromatic hydrocarbons containing at least one unsubstituted hydrogen atom. As an example, 10 moles of benzene gave 0.54 moles of phenol on being heated to 625°F for two hours under autogeneous pressure with water and 2 moles of copper sulphate. Naphthalene is stated to give 2-naphthol.

Phenols Synthesis

An interesting syntheses of polymethyl and other polyalkyl phenols has been developed. The methyl ether of a simple phenol having a free *o*- or *p*-position, when treated with dimethyl formamide in the presence of phosphorus oxychloride, gives an aldehyde, e.g. $CH_3.C_6H_4.CHO$ which on reduction with hydrazine gives the corresponding methyl anisole, e.g. $CH_3O.C_6H_4.CH_3$. This can be hydrolysed to the free phenol with pyridine hydrochloride, an overall yield of more than 50 per cent being claimed. Xylenols and higher homologues have been prepared in this manner.

A Japanese patent (No. 3676 ('55)) describes the production of alkyl phenols by treating phenols with olefin-containing hydrocarbon vapours in the presence of sulphuric acid or a sulphonic acid at a temperature between the boiling points of the phenol and the hydrocarbons.

Work by the Pittsburgh Consolidation Coal Co. (US Patent 2,789,146) has dealt with removal of 2:6-xylenol from cresols. Tar acids, recovered from low temperature tar oils by countercurrent extraction with 55 to 75 per cent aqueous methanol and naphtha are distilled and a 190° to 203°C cresol cut is subjected to countercurrent extraction with hexane and 30 to 50 per cent aqueous methanol. This reduces the 2:6-xylenol content of the cresol from 18 per cent to 6 to 8 per cent; the xylenol preferentially dissolves in the hexane from which it is recovered. At 202 to 230°C 3:5-xylenol does not react with *iso*butylene and can thus be separated from it. Reaction conditions have been detailed by Russian workers. The 3:5-xylenol is recovered by extracting the butylated product with alkali, springing and distilling.

Deodorisation of phenolic products by treatment with 0.1 to 0.4 per cent of their volume with 30 per cent hydrogen peroxide under mildly alkaline or neutral conditions at temperatures of 0° to 150°C for periods of from 8 to 96 hours is reported by Timbrol Ltd., Australia (A. Patent No. 147,351). Alkali metal or alkaline earth peroxides, percarbonate or perborates may also be used.

Laboratory work on the dephenolation of effluents by steaming has been described by a Russian investigator. Stripping the phenols from the steam is stated to be adversely affected by too high a concentration of caustic soda in the absorption section of the scrubber. Volatile ammonia in the effluent is said to reduce the efficiency of both absorption and desorption. As much as possible of any ammonia present should be removed therefore in the evaporation section of the ammonia column. The suggestion is made that existing dephenolation plants could be made more effective by an improved design of scrubber, by using metal packing instead of coke and by increasing the density of the sprays of circulating solution (A. M. Cyrmberg, *Koks i Khim.*, 1957, No. 3, 34). Another Russian, however, criticises the importance laid on the caustic soda, in the light of works experience. Introduction of efficient metal packing instead of coke is considered essential (E. M. Shimko, *ibid.*, No. 12, 44).

Tar bases: A new scheme for the operation of an ammonia column in conjunction with pyridine and dephenolation units has been described in a Russian paper. Carbon dioxide, hydrogen sulphide and cyanogen can be removed from the ammonia column feed stock and phenols from the ammonia vapour used in the pyridine plant. It is considered that this should result in less corrosion of the equipment, easier pyridine rectification and higher dephenolation efficiency.

Pyridine Bases Separation

For separation of pyridine bases, ion-exchange resins are specified in a Japanese patent (No. 7576/55). Tar bases at 140° to 145°C are diluted slightly with water and treated with Amberlite IR-120; 3-picoline is obtained from the treated solution and elution of the resin with dilute hydrochloric acid gives 4-picoline and 2:6-butidine. A Russian patent (No. 101,691) suggests that pyridine and 2-picoline can be separated by adding manganese thiocyanate, filtering of the pyridine addition compound and recovering the 2-picoline from the filtrate.

Monocyclic aromatic hydrocarbons: Ninety-five important commercial production or separation processes for monocyclic aromatic hydrocarbons have been collected. Among these are mentioned particularly, ethyl benzene manufacture from ethylene and benzene employing aluminium chloride as catalyst; dehydrogenation of ethyl benzene to styrene; and manufacture of cumene by Universal Oil Products process, in which benzene is alkylated with propane/propylene mixture in presence of a solid phosphoric acid catalyst. In this last process, it is reported that a trace of water is needed in the vaporised feedstock

to maintain catalyst activity (B.P. 769,383). Subject of a patent to Chempatents Inc. (B.P. 782,084) is the alkylation of benzene with propylene in presence of an acid-reacting alkylation catalyst to give a mixture of mono and di*iso*propyl benzenes. A similar process, is claimed by Distillers Co. Ltd. (B.P. 764,338) for production of cumene, afterwards converted to *m*-di*iso*propyl benzene by contacting it with 0.1 to 2. moles per cent of aluminium chloride.

Phthalic acid production: Liquid phase oxidation of xylenes by oxygen-bearing gases is noted as presenting difficulties as solid toluic acids separate out and restrict further action. However, a German company claims (B.P. 787,054) that this can be overcome by addition to *p*-xylene of 25 to 50 per cent of *p*-dialkyl benzenes with two or more carbon atoms in at least one side-chain. Pressures in the range 4 to 10 atmospheres and temperatures of 150°C to 180°C are employed. The product is mainly terephthalic acid. In a three-stage process by California Research Corporation (B.P. 788,212) liquid xylene is first catalytically oxidised by air to toluic acid while a toluic ester of an alcohol of not more than three carbon atoms is catalytically oxidised to a phthalic acid mono-ester. Heated with toluic acid at below 150°C, a phthalic acid and a toluic ester is yielded, which is recycled to the oxidiser.

Two patents to N. V. de Bataafsche Petroleum Maatschappij (B.P. 778,946) describe the production of phthalic acids by the action of oxygen on dialkyl benzenes in an organic solvent such as acetic acid, in the presence of soluble salts of manganese, cobalt, or barium. *Isophthalic* acid is produced from *m*-di*iso*propyl benzene at about 5 to 15 atmospheres and 125°C to 175°C. For terephthalic acid from *p*-dialkyl benzenes, excess of oxygen is passed through the reaction mixture, this carrying away certain undesirable volatile by-products and removing the heat of reaction. Pressures of 4 to 8 atmospheres and temperatures 100°C to 140°C are specified.

Phthalic Anhydride

A vapour-phase process, developed by California Research Corporation for production of phthalic anhydride, preheats *o*-xylene vapour and air which are passed over a vanadium pentoxide catalyst at 900°–1150°C. The product is purified by vacuum distillation, using two stills in series. Patent B.P. No. 766,564 by Imperial Chemical Industries deals with oxidation of *p*-di (*sec*-alkyl) benzenes to phthalic acids with nitric acid at a high temperature in presence of a vanadium compound; copper compounds may also be present. USP 2,789,988, claims the conversion of phthalic acid to phthalic anhydride by heating at 290°C with an aliphatic acid having two to eight carbon atoms.

Polycyclic aromatic hydrocarbons: According to a Russian patent (100,957), a mixture of phthalic and maleic anhydrides can be obtained by vapour-phase oxidation of fluorene in air. A 90 per cent yield of phthalic anhydride can be achieved, it is claimed, by using a fused vanadium pentoxide catalyst.

Section I of the review ends with a chapter dealing with 'Utilisation of coal tar and its products'. Section II deals with general chemistry and chemical technique under the headings organic chemistry, catalytic chemistry, physical chemistry, analytical chemistry and chemical techniques.

US PETROLEUM COMPANIES AID FRENCH CHEMICALS EXPANSION

UP to the last war, French chemical industry was mainly inorganic heavy chemicals and fertilisers, and apart from medicinals and pharmaceuticals, organic chemicals were underdeveloped. With the increase in transport, old refineries have been modified and expanded and new ones have been set up.

French refineries are now a valuable source of chemical raw materials and in the last few years, with assistance from US companies, have advanced rapidly.

Seventeen petrochemical plants are planned or are under construction and are due to be in operation during the five-year plan 1957 to 1961.

French Petrochemical Plants (Already in Operation)

Company	*Site*	*Raw material*	*Product*	*Applications*
Atlantique-Progil Electrochimie	Donges	Propylene (P) Benzene (C)	Cumene	Phenol and acetone
Progil-Electro-chimique	Pont-de Claix	Cumene	Phenol and acetone	Solvents, chlorinated phenol, synthetic tannin matter, phenol resins
Rhone-Poulenc	Peage-de-Roussillon	Propylene (P) Benzene (C)	Phenol and acetone	Solvents, nylon
Shell-St. Gobain	Grand-Couronne	C_{12}-hydrocarbons illuminating oil	Alkyl-sulphonates	Detergents
Shell-St. Gobain	Berre	Propylene (P)	Isopropanol and acetone	Solvents
Marles-Kuhlmann	Chocques	Propylene (P)	Propylene oxide and derivatives	Polyester resins
Esso-Standard	Port-Jerome	Propylene (P)	Propylene tetramer	Detergent alkylate
Standard-Kuhlmann	L'Estaque	Benzene (C) Propylene tetramer	Detergent alkylate	Cleaners
SIDA	La Chambre	Isopropanol (P) Sec. Butanol (P)	Diacetone alcohol, Methyl-isobutyl-ketone, methyl-ethyl ketone	Solvents
Naphtachimie	Lavera	Heavy oil and illuminating oil (P)	Ethylene oxide derivatives, Isopropanol and acetone	Antifreeze solvents polyester resins

P = from crude oil C = from coal

Planned Petrochemical Plants

Company	*Site*	*Raw material*	*Product*	*Application*
Shell-St. Gobain	Berre	Heavy residues from petroleum-cracking (P)	Sec. Butyl alcohol and derivatives, higher olefines, middle aromatic olefines (raw material for carbon black)	Solvents-alkyl aryl and alkyl suphonates octanol, various products for plasticisers, carbon black
Cabot France	Berre	Heavy aromatics (P)	Carbon black	Motor-car tyres
SOCABU	Port-Jerome	Isobutene (P)	Butyl rubber, butadiene	Motor-car tyres, tubeless tyres
SOCABU	Port-Jerome	Butadiene (P) Styrene (C or P)	GRS	Synthetic rubber GRS
Soc. Normande de Matieres Plastiques	Port-Jerome	Ethylene (P)	Ziegler-poly-ethylene	Synthetic resins
Ethylene Plastiques-Normandie	Port-Jerome	Ethylene (P)	ICI-polythene	Synthetic resins
Esso-Standard	Port-Jerome	Benzene (C) Propylene tetramer (P)	Detergent alkylate	Detergent materials
Courrieres-Kuhlmann	Harnes	Butylene dimer (P) Propylene trimer (P)	Higher alcohols C_7-C_{11}	Plasticisers, cleaning agents
Marles-Kuhlmann	Gonfreville	Ethylene (P)	Ethylene oxide and derivatives	Antifreeze solvents, polyester resins
CFR	Gonfreville	Propylene (P)	Propylene tetramer	Detergent alkylate
Petrosynthese	Gonfreville	Benzene (P.C.) Propylene tetramer	Detergent alkylate	Detergents
Manufacture Normande de Polyethylene	Gonfreville	Ethylene (P)	Phillips polythene	Synthetic resins
Antar-Petroles de l'Atlantique	Donges	Crude oil	Benzene, toluene, xylene	Raw materials
Pechiney	St.-Auban	Propane (P)	Trichlor-ethylene Carbon tetrachloride	Solvents
Progil	Pont-de-Claix	Propane (P)	Trichlor ethylene and carbon tetra-chloride	Solvents
Naphtachimie	Lavera	Ethylene (P)	Ziegler-polythene	Synthetic resins
Rhodiaceta	La Belle Etoile, near St. Fons	Paraxylene Ethylene glycol	Terephthalate	Tergal terephthalate fibre

P = from crude oil C = from coal

Arseniuretted Hydrogen Poisoning in Tank Cleaners

ACCORDING to Dr. A. T. Doig (*Lancet*, 12 July, p. 88) the danger of poisoning by arsine liberated during the cleaning of sulphuric acid tanks is not sufficiently appreciated by factory managers or technical staff. He quotes three recent cases, one of them fatal, where men have been poisoned after entering tanks to remove deposits.

Arsine is liberated whenever acid prepared from arsenical pyrites or metal containing arsenical impurities reacts with the evolution of nascent hydrogen, and is therefore always liable to attend the manual removal of deposits from acid tanks with metal tools. If possible, entry to tanks should be made unnecessary by remote means of cleaning; repeated flushing with water and draining, or for refactory deposits treatment with strong alkali and steam, should be adequate if cleaning is frequent enough.

Toxic symptoms follow exposure to 3 to 10 p.p.m. of arsine for several hours, or 16 to 30 p.p.m. for only half to one hour. The maximum allowable working concentration is 0.05 p.p.m., and repeated exposure may have a cumulative effect. Arsine causes acute haemolytic anaemia and jaundice, kidney damage, and in severe cases suppression of urine and death. Gastric upset and the passage of port-wine coloured urine occurring 2 to 24 hours after possible exposure should raise a suspicion of arsine intoxication. Medical advice and hospitalisation immediately should be sought.

Dunlop Design Own Plant Latex Production

LATEX compounds and adhesives are now being produced by the compositions division of Dunlop Rubber Co. at Birmingham in a new plant specially designed by their own chemical engineers.

Special feature of the plant is the large mixing and vulcanising tanks which provide for mixing at low or high viscosities, vulcanising at a range of temperatures and de-aerating under controlled conditions when required. Advantages from this one precise control of temperature, ensure uniform vulcanisation, thereby giving a more satisfactory product, and reduced handling improves labour efficiency and reduces waste.

Monograph on PVA

"Polyvinyl Acetate Emulsions" is the title of a monograph produced by Vinyl Products Ltd., Butter Hill, Carshalton, Surrey. The booklet has 22 pages outlining the general characteristics of p.v.a. emulsions and an appendix of 13 pages giving details of the various methods used by the company. Later, technical data sheets will also be available on the range of Vinamul emulsions manufactured by the firm. The monograph includes information on the manufacture and properties of p.v.a. emulsions and films; additives; processing; storage and use selection.

MONSANTO OPEN NEW OIL ADDITIVES LABORATORIES

OFFICIALLY opened last week, the Monsanto Chemicals Ltd. oil additives laboratories at Newport, Mon., are fully equipped for the estimation of the elemental analysis of oils and additives. Speaking at the opening, company chairman, Sir Miles Thomas, said the buildings were part of a comprehensive plan for extending the firm's applicational research and technical service.

'We have learned from hard experience', he said, 'that to sell a product—even a good product—is not enough. It must be backed by first-class research and technical service for the benefit of the customer, and the field of oil additives offers an excellent example. We are not the only manufacturers of these materials. If we are to hold our markets, therefore, we have no choice but to attempt to offer that extra service which only begins after the product is sold'. Over 40 per cent of Monsanto's business comes from exports and this is the field which offers the greatest challenge.

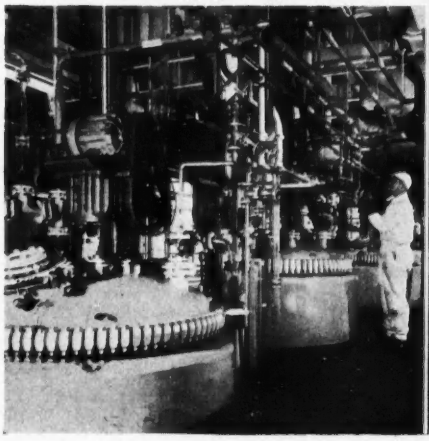
Equipment in the new physical laboratory at the factory includes kinematic viscosity baths; an electronic pH meter with automatic titrator for the determination of acid content in oils; a thermostatically controlled pour-point refrigerator with three independently controlled baths operating at 30°F, 0°F and —30°F. The oil blend laboratory is where all test blends and experimental additive formulations are prepared and in this room are three steam-jacketed blending vessels of 10-, 25- and 50-gall. capacity, stirred by semi-rotary air motors and scroll-type paddles. This equipment is said to be so versatile that blending to every kind of requirement is permitted.

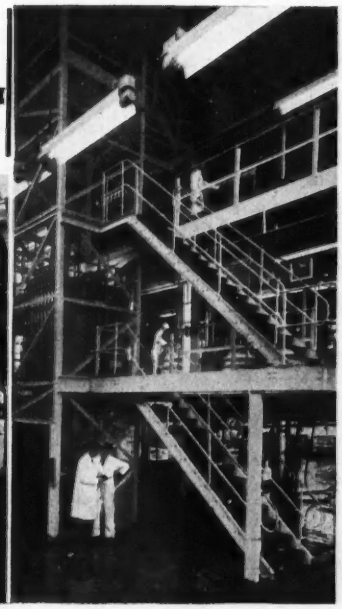
The chemical laboratory has, among other items, potentiometric titration instruments. The three laboratories are all conveniently placed together and are situated near the specimen and store rooms.

In this picture C. O. R. Bell, Monsanto's chief automobile research engineer, explains the workings of the axle test rig to Harold Watkinson, Minister of Transport and Civil Aviation, who officially opened the laboratories, and Sir Miles Thomas, Monsanto's chairman, right. Left, background, is Dr. J. W. Barrett, director of Monsanto's plastics division, and technical director

New Chemicals Plant of Winthrop Laboratories at Fawdon

Two pictures taken at Winthrop Laboratories new £2¼ million Newcastle-upon-Tyne plant (see CA, 12 July, p. 63). Below is a typical operating platform showing controls for services and for feeding and discharging reaction vessels. Right, part of the intermediates section where Hypaque is produced





ICI OPEN NEW MARINE RESEARCH STATION AT BRIXHAM

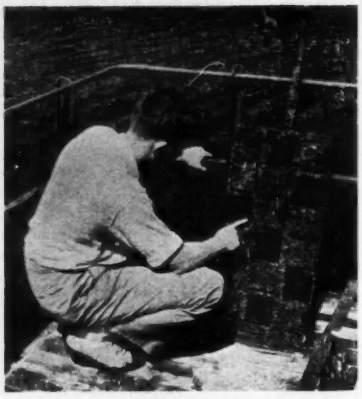
A NEW laboratory has been put up at Brixham, Devon, to replace temporary buildings converted in 1947 for use as the Marine Research Station of Imperial Chemical Industries Ltd. (paints division). The new station has some 5,500 sq. ft. gross available space and is situated at Freshwater Quarry close to the edge of the harbour. Brixham was originally selected because the waters in and around the harbour contain a wide variety of the marine organisms to be studied.

The station is not only concerned with the testing of marine paints, but also with their formulation; the new laboratory includes facilities for making varnishes and resins, as well as for preparing experimental quantities of marine paints. The whole of ICI's research on marine paints, formulation, application and laboratory investigation and testing have been concentrated in this one unit. In addition, work is also carried out at the station on problems for other divisions of ICI. In particular, the station is actively concerned with research on the prevention of pollution when trade wastes from chemical factories are discharged into natural waters, especially estuaries.

The research workers have studied the habits, life-cycles and resistance to new anti-fouling poisons of a wide range of marine organisms. One of the problems is to so formulate poisons for paints that 'leaching out' continues at a uniform rate for the longest possible period. Facilities have also been provided for studying the effect of water movement on underwater, topside and superstructure paints. Systems of cathodic protection either by magnesium anode or impressed current methods are also investigated.

Following work at the laboratories, paints below water are exposed on rafts moored in deep water at Brixham, Burnham-on-Crouch, Essex, and in tropical waters. Above-water panels are also exposed to test the action of sunlight and rapid alternation of wetting and drying. Extensive use is made of statistical methods of assessing the performance of the numerous small Tufnol panels fastened to the sea rafts.

A particular feature of the new station is that it has a continuous supply of seawater drawn from the outer harbour. Carried in polythene piping to avoid any metal contamination, up to 30,000 gall. of water per hour can be pumped for use in experiments. For testing underwater anti-corrosive paint systems, this laboratory sea-water can be controlled in respect of temperature, pH, oxygen concentration and rate of flow.



These Tufnol panels are used in initial tests on anti-fouling paints

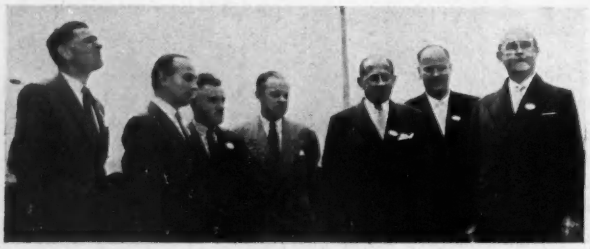
Duties Re-imposed on Imported Siloxanes

The Treasury announces that exemptions from import duties on certain siloxanes and mixtures thereof have been withdrawn, and that customs duties of 10 per cent have been re-imposed on all except those mixtures of siloxanes that are varnishes. These latter are to be subject to 12½ per cent duty. These changes, made under the Import Duties (Exemptions) (No. 14) Order, 1958, and the Additional Import Duties (No. 4) Order, 1958, came into operation on 14 July.

Spherical Plug Valve

In our report of the Saunders Valve Co. Ltd. exhibits at Olympia (CHEMICAL AGE, June 14, p. 1112) an impression was given that the spherical plug 'M' valves were available in sizes from ½ in. to 12 in. and could be electrically operated in that range. At present the 'M' valve is made in 6 sizes only from ½ in. to 3 in. and is produced simply as a quick action manually operated valve.

New Welfare Block for Ashburton



Directors of Ashburton Chemical Works Ltd., at the opening of a new welfare block (l. to r.) A. Smith, H. Stromberg, G. A. Tillotson, H. Jones, Dr. H. Meerwein, Dr. F. Buchmeier, chairman, C. F. Gysin

Changes in Occupational Diseases Insurance

ALTERATIONS* have been made to the schedule of occupational diseases for which workers are covered for the benefits of the Industrial Injuries Act. The regulations implement the recommendations made in the recent report of the Industrial Injuries Advisory Council, and came into operation on 7 July. It is expected that only a few injured persons will be affected.

Among the changes is the widening of description of poisoning by some substances, e.g. lead, benzene, to include certain of their compounds. Extensions are also made in the definitions of other diseases, including industrial dermatitis and radiation injuries. Special provisions are made for persons who have already contracted a disease, in a form now covered, between 5 July, 1948 and 7 July 1958. Claims for benefit should be made to the local Pensions and National Insurance Office.

**National Insurance (Industrial Injuries) (Prescribed Diseases) Amendment Regulations, 1958, S.I.1958 No.1068, price 6d., obtainable from HM Stationery Office or through booksellers.*

SEGB to Build First Gas-from-Oil Plant

BRITAIN'S first town gas-from-oil plant employing the Shell gasification process is to be built by the South Eastern Gas Board at its new works adjoining the BP Refinery, Isle of Grain.

The £3 million contract has been placed with the Woodhall-Duckham Construction Co. Ltd.

A daily output of 20 million cubic feet of gas from a range of oil feedstocks is scheduled, and it is claimed that the content of sulphur and carbon monoxide of gas produced by the new process is so low that the risk of gas poisoning is practically eliminated.

Use of the process, a gasification system with oxygen under pressure, has been licensed to the board by NV De Bataafsche Petroleum Maatschappij, an associate of Shell Petroleum Co. Ltd.

New Panel to Study Food Contamination

THE former Metallic Contamination Panel of the British Food Manufacturing Industries Research Association is to be reconstituted to examine the methods of detection and determination of a wider range of trace materials, announced Dr. A. A. Houghton, chief research chemist of Mars Ltd., at a meeting of the Sugar Confectionary Panel. It was recommended that priority should be given to work on artificial colours in view of the importance of the export trade in confectionery and the wide divergence between foreign food laws.

New Pollution-prevention Works

A £2½ million sewage disposal works built to prevent pollution of the rivers Trent and Derwent was opened recently. The work was begun in 1951, after an injunction had been obtained by angling clubs restraining Derby Corporation and British Celanese Ltd. from polluting the rivers. Both the Corporation and British Celanese contributed to the cost.

Overseas News

US CRUCIBLE STEEL PRODUCE TOUGHEST TITANIUM TO DATE

A MAJOR development in titanium is claimed by Crucible Steel, who have developed β-titanium alloy. This alloy is considered likely to be the strongest titanium alloy made to date.

This β-titanium alloy is being produced on a pilot-plant scale now. In the process, the high temperature structure of titanium is stabilised down to room temperature. The stabiliser elements—13 per cent vanadium, 11 per cent chromium—add hardening properties. The alloy still retains β-titanium's formability. To obtain a proper balance of alloying elements so that the structure remains all beta during forming (and/or slow cooling) and ages to high strength levels quickly and at low temperatures without becoming brittle, 4 per cent aluminium is used.

Annealed with normal cooling B-120 VCA sheet 'solution quenches' to a soft formable state. Minimum yield strength in this state is reported to be 120,000 p.s.i. Ageing B-120 VCA from 20 to 100 hours, at 850° to 950°F, strengthens the alloy up to 200,000 p.s.i. yield strength.

New Head Office for Union Carbide

Next year the 11-storey head office building for Union Carbide Canada Ltd. in Toronto should be completed. The building will bring together Union Carbide's management personnel, and its operating divisions, Bakelite Co., Carbide Chemicals Co. Ltd., Electro Metallurgical Co. Ltd., Linde Air Products Co. Ltd., National Carbon Co. and the Visking Company.

Port Kembla Contact Acid Plant

Australian Fertilisers Ltd. have awarded the contract for fabrication and erection of the No. 2 sinter gas contact acid plant at their Port Kembla works to McDonald Constructions Pty. Ltd., Mascot, New South Wales. Site work has been started and the plant is scheduled for completion in mid-October. The contract takes in main building, pump house, converter, heat exchangers, cooling, adsorption and drying towers, mist catcher and acid pump tanks, pipes and ducting.

Montecatini to Cut Fertiliser Prices

Output by the Italian Montecatini Company of chemical products, plastics materials, synthetic fibres and lead are up for the first few months of this year, while aluminium, sulphuric acid and zinc are down.

Total sales for the first half of 1958 were 4 per cent down on the corresponding period last year, and this is ascribed to the general recession. A current advertising campaign in Italian newspapers indicates that the company plans to reduce prices of nitrogenous fertilisers to compete with new prices announced by Anic's Ravenna factory.

Hoffman-La-Roche Investment in India

The Swiss chemical firm of Hoffman-La-Roche are putting up 89 per cent of the capital for a subsidiary they have established in India. The balance is being provided from Indian sources.

Yugoslav Factories Pool Technical Resources

Three Zagreb factories, Chromos, Katran, and Pliva, combined last year in technical research and development, market research, the recruitment of technical personnel, and the co-ordination of their respective manufacturing capacities. They are said to have solved jointly some problems relating to the production of organic dyes and pigments. (Katran is believed to specialise in coal tar derivatives, Chromos in paint manufacture, and Pliva in pharmaceuticals.) They are now going to extend their co-operation to the manufacture of plant protection products and plastics.

Salt Exports From Taiwan

Salt exports are becoming one of Taiwan's (Formosa) foremost earners of foreign exchange. Of the total production of 359,952 metric tons in 1957, 202,404 tons were exported, earning the equivalent of US$2.2m. Japan was formerly the only market for salt from Taiwan and is still the chief buyer, but new markets have been opened up in the Ryukyus, Malaya, Singapore, the Philippines, Korea and Hong Kong.

Foreign Investments in Italian Chemical Industry

During January/May 1958 approximately £7 million was invested in Italy for foreign companies. The largest item in this total constituted approximately £3,500,000, invested by a US company in chemical-pharmaceutical sector.

An investment was made by a German company in a factory producing containers for chemical products, in Aprilia. Schwarzkopf, of Hamburg, invested about £16,000 in Testanera S.R.L., of Florence, chemical producers. Delta-Werke AG, of Zofingen, and Geistlich Sohone, of Schlieren (Switzerland), are investing nearly £17,000 in Besozzo, of Varese, who are to build a factory for the production of synthetic paints. R. Racusa, of Zurich, is investing about £8,600 in Fermentfarma, of Milan, manufacturers of pharmaceuticals.

Phillips are Now Largest US Uranium Producers

Phillips Petroleum Co., have become one of the largest uranium concentrate producers in the US, with the start-up of operations at a new ore processing mill in McKinley County, New Mexico. According to the company, the mill will process 1,725 tons of ore a day.

The uranium concentrate produced by Phillips is to be sold to the US Atomic Energy Commission under a contract which runs until 1966.

Ammonia Synthesis from Coke-Oven and Blast-Furnace Gases

Dr. Ing. F. Bogner, writing in *Chemie—Ingenieur-Technik* (1958, **30** 382), reports that blast furnace gas has been added directly in ammonia synthesis at a smelting plant. As a result the following simplified combination of processes has been found: Utilisation of the hydrogen in the coke-oven gas and additional production of hydrogen by cracking the methane content; mixing of these cracked gases with blast-furnace gas; carbon dioxide conversion; removal of carbon dioxide and residual carbon monoxide from the gas; and synthesis of hydrogen and nitrogen to ammonia. The paper gives technological details and operating experience is indicated.

Expansion of Phthalic Anhydride Plant in Australia

Good progress is reported on the construction of a £1 million extension to the phthalic anhydride plant at Newcastle, Australia, by the Newcastle Chemical Co. Pty. Ltd. The purification section of the plant is now in operation.

The plant is expected to be in full production this year, and is designed to ensure that all Australian demands for this chemical can be supplied from local production, thus saving about £500,000 a year in Australian overseas funds.

Newcastle Chemical Co. are a joint subsidiary of Imperial Chemical Industries of Australia and New Zealand Ltd., and the Broken Hill Proprietary Co., Ltd. It was established just prior to World War II to assure Australia of supplies of certain basic chemicals, using some of the by-products of coke-production as raw materials, in this instance, naphthalene.

US Monsanto/Lever Bros. Detergent Anti-Trust Suit

The US Department of Justice has filed a civil anti-trust suit against Lever Brothers to give up their rights to sell the 'All' household detergent which it acquired from Monsanto in May last year.

As part of the acquisition arrangement, the Department states, Lever Brothers undertook to buy Monsanto products. This, it is charged, is in violation of the Clayton Act by eliminating competition between two companies and tending to

lessen competition in the detergent field. The Department's complaint is that before Lever Brothers acquired 'All', Monsanto had about 5 per cent. of the detergent market, and following the acquisition Lever has 20 per. cent of the market. Therefore the US Government is asking the Court to order Lever to divest itself of 'All'.

Australian Sulphuric Acid Plant Extensions

Until 1948 sulphuric acid requirements of Electrolytic Zinc Co. of Australasia Ltd., at their Risdon works were supplied by firstly a Schmiedel and later by a small Mills Packard chamber sulphuric acid plant. This was then replaced by a larger modern contact acid plant. A second contact unit has now been erected giving a total sulphuric acid production capacity of 130,000 tons a year. This is now being increased, it is reported, with the provision of a third contact acid plant unit to provide for a total output of more than 170,000 tons a year.

Acid produced at Risdon supplies the zinc plant, superphosphate plant, sulphate of ammonia plant and the Tasmania sulphuric acid market. Some acid has also been shipped to South Australia and New South Wales during recent years.

Canada's Biggest Solvents Plant Starts Production

Canada's largest petroleum solvents plant, planned to turn out 600,000 barrels a year, is being brought into production by Imperial Oil Ltd., at its Sarnia, Ontario, refinery. Built at a cost of $4,500,000, the plant will be fed by petroleum components from the refinery's main distillation units.

Last year, Canadian industry used 1,400,000 barrels of domestic and imported naphthas, and Imperial Oil estimate that the new plant can displace $2,250,000 of imported products annually.

Israeli Potash Output

It is reported from Jerusalem that production at the Israeli Dead Sea Potash Works, at Sodom, has now reached an annual rate of 100,000 tons. In the first six months of this year output totalled 47,000 tons (compared with 37,000 tons in the corresponding period of 1957), and is still rising steadily.

BP's Hamburg Butane Unit

At British Petroleum's Hamburg refinery, a unit capable of producing up to 23,000 tons a year of high purity normal butane has been commissioned.

India's Chemical Projects

A Soviet delegation in New Delhi is expected to finalise shortly the project for manufacturing pharmaceutical intermediates. A long-term credit of Rs. 100 million and technical know-how has been offered by Russia for establishment of this project.

Another project at an advanced stage of negotiation is that of the establishment of a dyestuffs intermediates industry. The negotiations are with Farbenfabriken Bayer AG.

Equal priority is being given to these projects by the Indian Government.

More Pure Glycerine From Dow Chemical

Processes developed by the Dow Chemical Co., Midland, Michigan, US, enable them to produce three grades of glycerine purer than the company's previous counterparts. The new plant handling these grades also doubles the capacity for synthetic, 96 per cent and 99.5 per cent USP grades.

$25m. Loaned to Chilean Nitrate of Soda Co.

Anglo Lautaro Nitrate Co., Sr. Enrique Valenzuela, Chile, are said to have been granted a $25 million loan by the US Export-Import Bank. The sum will be used to modernise the plants in operation at Maria Elena and Pedro de Valdivia.

Record Canadian Uranium Exports in May

Canada's May exports of uranium ores and concentrates were a record, being valued at $20.86 million; more than double the $9.08 million in May 1957. Consistent gains have been reported for each month of this year and exports for the first five months total $89.93 million compared with $35.74 million in the corresponding period a year ago.

SI-RO-SET for New Zealand

Si-Ro-Set, the CSIRO process for permanently creasing woollens, is to be introduced in New Zealand. The prepared solution for use in the process will be available in the country from several chemical companies and approved manufacturers will be allowed to use the certification mark Si-Ro-Set to indicate their solution may be employed satisfactorily.

D. M. Lipson of the Geelong Wool Textile Research Laboratories and Dr. A. J. Farnworth, inventor of the process, are spending several weeks in New Zealand to demonstrate the process to the trade and to establish a licensing system. The visit is a joint venture of the Australian Wool Bureau and the New Zealand Wool Board.

Brazilian Firm Set Up Factory in Argentine

A factory has been inaugurated at Belfort Roxo, near Rio de Janeiro, to manufacture dyes and similar products for the paper, textile and leather industries, as well as fertilisers, insecticides and basic industrial chemicals. The company concerned is the Brazilian subsidiary of the German Bayer group.

First Dominican Nitric Acid Plant

The Dominican Republic firm of Fabrica de los Servicios Tecnologicos has recently started nitric acid production, the first time this chemical has been produced in the Republic. The new installations have a capacity of 5½ tons a day. It is stated that, besides covering all the armed forces' needs for explosives, the factory will also make sufficient nitric acid to cover the requirements of the Republic's industries.

Egypt's NaOH Plant

Italian offers to manufacture the caustic soda plant scheduled under the Egyptian five-years plan have been the subject of discussion between the Italian Ambassador and the Egyptian Industry Minister.

NZ Fertiliser Works Operating

Full production has started at the £1 million fertiliser works of the Kiwi Fertiliser Co. Ltd., at Morrinsville, New Zealand. Annual capacity is 100,000 tons of superphosphate.

New US Aluminium Alloy may Reduce Nuclear Power Costs

X-8001, a new aluminium alloy, is expected to help reduce the cost of producing nuclear power. It has been developed by scientists in the metallurgy division of the US Atomic Energy Commission's Argonne National Laboratory, Lemont, Illinois. The experimental alloy will be used as a protective jacket or cladding for fuel elements in the Argonne low power reactor now being built at the National Reactor Testing Station in Idaho. This reactor is a prototype unit of a portable boiling water reactor for power generation and space heating in remote areas, such as the Antarctic.

The new alloy was developed by Dr. Joseph E. Draley, senior chemist, Westley E. Ruther, associate chemical engineer, and their co-workers, by adding small amounts of nickel to aluminium 1100, a commercial alloy which contains iron. Addition of nickel made the alloy much more resistant to corrosion by high temperature water than commercial aluminiums having iron as the primary alloy.

Compared with present cladding materials, such as zirconium, which are more expensive than aluminium, and generally more difficult to fabricate and process if used as a fuel cladding material, the new alloy could effect substantial savings in the operation of large-scale nuclear power plants.

In their experiments, Dr. Draley and his co-workers also demonstrated the anti-corrosion properties of nickel salts in aqueous solution. Aluminium was tested in a solution of water acidified with sulphuric acid,to which five parts per million (as nickel sulphate) were added. Results indicated a much lower rate of corrosion on the aluminium than in water not containing nickel sulphate.

SYNTHETIC RUBBER INDUSTRY TO BE SET UP UNDER NEW INDIAN PLAN

THE Indian Government has accepted the recommendation of a committee of experts that the development of industries such as synthetic rubber, DDT, pharmaceutical products and acetate rayon, which are based on industrial alcohol, should be encouraged on a priority basis

There are at present 45 distilleries in India producing 18 million galls. of power and industrial alcohol (95 per cent by vol.) mainly from molasses. The availability of molasses for the production of alcohol, estimated on the basis of the programme envisaged for expansion of the sugar industry during the second five-year-plan, is of the order of 1 million tons. The total production of alcohol from this source plus about 1 million gall. produced from the *mahua* flowers would be about 46.8 million gall. a year. The installed distillery capacity recommended for achieving this production is of the order of 52 million gall. a year. Suitable locations for new distilleries and expansion of existing distilleries to achieve the target production have been indicated.

Most of India's output, about 10m. gall., is used as motor fuel and the rest as potable spirit (4 million gall.) and for industrial purposes (4 million gall.) There are various difficulties at present in increasing the demand for alcohol for use in motor spirit. With increased production of alcohol therefore, substantial quantities will have to be diverted to other uses and the present pattern of utilisation will have to be changed. As alcohol is available at a low cost, it could be used as a basic raw material for plastics like polythene, polystyrene, cellulose acetate and p.v.c.; solvents like butanol, ether and acetone; and for DDT, synthetic rubber and pharmaceuticals.

Alcohol-based Projects

A number of new projects based on alcohol are now under way. These include manufacture of polythene, ethylene dichloride, acetic acid and various solvents, DDT, etc. The projects for synthetic rubber, and organic intermediates for dyes and pharmaceuticals, now under consideration, would absorb annually 10-12 million and 0.8 million gall. of alcohol respectively. The latter scheme would require, in addition, the following chemicals which can be economically produced from alcohol utilising a further 2 to 2.5 million gall. a year: acetic anhydride, acetone, butyl acetate, diethyl acetal, diethylamine, acetic acid, butyl alcohol, ethyl acetate, and ethylene oxide. There exists, besides, considerable scope for increasing the production of acetate rayon by establishing new factories. The manufacture of chloroform and ether has still to be developed.

The alcohol committee has formulated some specific proposals for the establishment and development of alcohol-based industrial units in the country. These include the following:

Ether. The three plants already in operation in Hyderabad, Baroda and Calcutta should be assisted in improving their efficiency and reducing the cost of production. Alcohol may be supplied to these plants at a low rate, free of duty.

Ethyl Chloride. A new unit may be considered if it is linked up with proposals for manufacturing chemicals like ethyl cellulose, tetraethyl lead, ethyl amines, etc. The existing unit at Baroda, which mainly manufactures BP grade, may be assisted in the supply of alcohol.

Acetone. A new unit based on isopropyl alcohol may be established in or near a port town. Normally the manufacture of acetone from alcohol would not be encouraged as it may be relatively less economical. It should be cheaper to produce acetone from imported isopropyl alcohol. Such a unit may be encouraged if it is linked up with the manufacture of solvents based upon acetone, diacetone alcohol, isophorone, etc.

Ethylene Dichloride. Two units have already been licensed and they may be assisted in the supply of low-cost, duty-free alcohol. A third unit may be set up if it is linked with a scheme for manufacture of vinyl chloride.

Ethylene Oxide Glycol and Derivatives. It may be feasible to set up one unit in Delhi in conjunction with the ethylene dichloride unit, using 300,000 gall. of alcohol. Alternatively, a site in West Bengal may be considered. Some quantity is also expected to be made by the solvents plant being set up in Bombay.

Acetaldehyde-based Chemicals. The requirements of these chemicals (excluding those of acetate rayon and cellulose acetate) are estimated as: Acetaldehyde, 1,200 tons for direct condensation products like acetal, paraldehyde, aldehyde ammonia, picoline, pentaerythritol, etc., acetic acid, 6,000 tons; acetic anhydride, 1,000 tons; esters (ethyl and butyl), 3,000 tons; crotonaldehyde, 1,400 tons for conversion to butanol, butyraldehyde, octanol, etc., and for direct use.

The new solvents project under way in Bombay is expected to make some of these items; but there is still scope for additional capacity to be established. One unit in UP and another in Madras, each using about 2 million gall. of alcohol per year could be set up.

Acetate Rayon and Cellulose Acetate. The unit in Hyderabad may expand production to 3,000 tons a year. A new unit with a capacity of 3,000 tons a year may be set up for cellulose triacetate at Mandya, Mysore State. One or more units for acetate rayon, each of 3,000 tons capacity may be set up in Bombay and Andhra.

Synthetic Rubber. This should be a priority scheme both from the point of view of alcohol utilisation as well as essentiality of the product. Manufacture of butadiene, one of the components required, may be established in UP. Over 11 million gall. of alcohol would be required for 15,000 tons of butadiene which is necessary for producing 23,000 tons of synthetic rubber (GRS).

The future of consumption of 46.8 million gall. of alcohol may be as follows: industrial uses, 30-32 million gall.; alcoholic liquors, 4 million gall.; and motor fuel, 11-12 million gall.

The Government has accepted the suggested targets of production of alcohol and alcohol-based industries. It is also agreed that power alcohol should continue to be used as a motor fuel to the extent necessary during the development period. The suggestion for the setting up of a development council for fermentation industry, including alcohol and products based on it, has been accepted.

Developments in Natural Rubber

PILOT scale batches of Heveaplus MG 30, a new grade of modified rubber for the production of transparent vulcanisates for surgical application, have been produced completely iron-free and with no antioxidant content by Rubber Technical Developments Ltd., according to the annual report for 1957 published last week.

Progress is also noted in the semi-commercial production of anti-crystallising rubber from smoked sheet on open mill, experiments indicating that large-scale work creates no added difficulties over laboratory scale production. Anti-crystallising properties are, in fact, superior with the large-scale preparations, but problems of scorch and low Mooney viscosity are still apparent.

Now that products made from depolymerised and liquid rubbers have been in extended service use, defects have been brought to light which are being investigated.

Porosity that has become apparent when compounds have been in prolonged storage prior to use is being overcome by compounding adjustments, but the low physical properties of vulcanisates from standard fluid rubber compounds continue to hamper further exploitation. Efforts continue to be made, however, to produce pourable compounds that will give improved tensile properties by polymer reinforcement of depolymerised rubber.

Natural rubber is being used successfully as a binder for non-woven fabrics, and what is described as a superior crease-resisting material with an attractive appearance has been produced using a crimped Terylene fibre.

The annual report of the Natural Rubber Development Board for 1957, also published last week, records a year of progress in extending the use of rubber throughout industry.

BASF'S POLYMER OUTPUT ROSE 31 PER CENT LAST YEAR

SALES by Badische Anilin- and Soda-Fabrik AG rose appreciably during 1957 and the company's total turnover reached DM.1,800 million. (DM.1,498 million in 1956), an increase of 20.1 per cent. The rise in exports surpassed the increase achieved in home market turnover figures, the export ratio amounting to 38 per cent. The company's share in the turnover achieved by industry in the Federal Republic amounted to 0.9 per cent and its share in the chemical industry's turnover represented 11 per cent. Among chemical exports from the Federal Republic BASF accounted for 15.1 per cent.

Investments by BASF at Ludwigshafen amounted to some DM227 million. Funds for this programme were provided partly by depreciation (DM152 million) and partly by an increase in the company's capital by DM102 million. The portion of the funds still available will be used to cover investments planned for 1958. There is no intention at the present time to resort to the capital market. Expenditure for research purposes during 1957 again amounted to some 5 per cent of the annual turnover.

Turnover in the dyestuffs, auxiliaries, and tanning agents sector continued to rise and exports accounted for a proportionally large part of the increase. Production was further increased in the inorganic chemicals field, and turnover figures, particularly in exports markets, rose as a result. A large-scale installation for the manufacture of sulphuric acid by the turbulent layer roasting process was taken into service during 1957.

Plastics Output Up

In the plastics field, BASF's output of polymerisation products rose by 31 per cent. Polystyrol made further progress and production installations are being extended. Production capacity for Vinoflex brands is to be extended. Home market turnover of the unsaturated polyester, Palatal, almost trebled and exports more than doubled. Production capacity is being expanded.

Sales of intermediates and auxiliaries for man-made fibres slowed down in the second half of 1956. Although production capacity for caprolactam, acrylonitrile and terephthalic acid dimethyl esters continued to increase, customers' requirements could not be fully met. Efforts are being made to speed up the expansion programme in this field.

Output of ammonia and nitrogenous fertilisers was bigger than in the previous year, but sales met with increasing competition in and outside Germany. Of the associated companies, Rheinische Olefinveerk GmbH (50 per cent BASF and 50 per cent Deutsche Shell AG) plant extensions for production of high pressure polythene made good progress and are expected to be in service this year. Production capacity was fully utilised but earnings were increasingly affected by foreign competition. It is proposed to erect a DM.27 million low pressure polythene plant using Phillips Petroleum Co.'s process.

At another associate company, Chemische Fabrik Holten GmbH (40 per cent BASF) work has continued to expand production capacity. Long-term contracts have made it possible to ensure supplies of ethylene in quantities sufficient to allow for future expansion of capacity. A capital increase of DM.5.28 million has been approved. Bunawerke Hüls GmbH, in which BASF have a 16⅔ per cent holding, is to have an annual capacity of 45,000 tons of Buna rubber. Production is expected to begin shortly.

Current year turnover of BASF is reported as being above that reached in the corresponding period of 1957. However, the report warns that, taking 1958 as a whole, sales cannot be expected to increase considerably because capacity is now fully utilised in a number of important plants.

Net profits amounted to DM.61,777,059. A dividend of 11 per cent, equivalent to DM.61,710,000 is proposed.

CRL Changes Name and Functions

CHANGES in the functions of the Chemical Research Laboratory proposed by the Council for Scientific and Industrial Research have been approved by Viscount Hailsham, Lord President of the Council. In addition the name of the laboratory is to be changed to the National Chemical Laboratory.

In order to make a real impact on selected problems of national importance, the laboratory will concentrate its efforts on a few objectives, covering only a limited part of the whole field of chemical research.

The selected problems include:

(1) Problems which are appropriate neither to industrial research laboratories nor to universities, because of the necessity for special facilities, experienced staff and continuity of effort.

(2) Solutions of problems which are of national economic value and have wide general applications to many industries.

(3) Those problems the solutions of which are urgently required for the nation's atomic energy programme.

The change in name is proposed because the present title may suggest that the laboratory exists primarily to serve the chemical industry.

Stocks & Shares

Markets Affected by Iraq

REPORTS coming in from Iraq about the Army coup there have, as would be expected, put a brake on what, over the last two weeks, has been a very encouraging picture. Consequently, prices, headed by those of oil shares have, with hardly an exception, been marked down considerably.

At the time of writing official information about the Middle East situation is far from complete. Investors at this stage will be well advised to hold good class equities and perhaps consider the purchase of one or two selective chemical equities, while the market is depressed and somewhat unsettled by the international position.

Taking a rather longer view the possibility of a further Bank Rate reduction cannot be dismissed and it would not be surprising to see the rate down to 4 per cent by the autumn. This will give the green light to industrial expansion which after a long credit squeeze has again started gaining momentum.

1958 High	1958 Low	Security	Price 15 July	Change over last two weeks
17/5½	13/4½	Albright & W. 5/-	17/1½	—1½d
10/9	10/3	Anchor Chem. 5/-	10/3	—
1/4½	1/-	Ashe Chemical 1/-	1/1½	—
20/7½	16/9	Bakelite 10/-	19/-	—
6/4½	4/6	F. W. Berk 5/-	5/7½	+1½d
20/4½	14/10½	Borax Dfd. 5/-	17/3	—6d
15/-	10/4½	Bt. Glues 4/-	14/1½	+1½d
5/10½	5/-	B. I. Plastics 2/-	6/-	—3d
9/1½	7/7½	Bt. Tar 2/6	10/4½	—
41/-	28/3	Bt. Xylonite	37/-	—1/6
4/4½	3/6	Coalite & Chem. 2/-	4/4½	—1½d
50/6	45/9	Fisons	49/-	—
10/1½	7/6	Hardman & H. 5/-	9/-	—4½d
36/3	31/-	Hickson & W. 10/-	37/6	+1/3
30/4½	24/3	ICI	28/1½	—10½d
3/4½	2/7½	Kleemann 1/-	3/1½	—
18/-	14/-	Laporte 5/-	17/1½	—
16/3	13/9	Lawes Ch. 10/-	16/3	—
16/1½	12/6	Monsanto 5/-	15/-	—3d
13/-	10/10½	Reichhold 5/-	12/-	—

In Parliament

Britain's Share of EONR Budget

COST of maintaining the European Organisation for Nuclear Research in 1958 is estimated at £4,660,000, of which the British Government contributes one-quarter, stated the Parliamentary Secretary to the Ministry of Works in Parliament last week.

Plutonium for Military Use

Plutonium production by civil nuclear power stations for military needs could be achieved without any harm to the vital and promising programme of those stations, stated Sir Ian Horobin, Parliamentary Secretary to the Ministry of Power last Friday. Changes to the civil power stations involved would be marginal and would not affect Britain's chances of exporting atomic power stations. The Minister admitted, however, that the cost of making the plutonium might be considerable, but it would be borne entirely on the defence note.

New Blacklead Pencil for Use on Plastics and Glass

A blacklead pencil which writes on plastics, china, glass, and all glazed surfaces is being marketed by the plastics packaging division of Gordon and Gotch Ltd., 75–79 Farringdon Street, London EC4. The makers claim that the Swan 'All-Stabilo' pencil writes clearly and densely on films, plastics, glass, metal, porcelain, stone, leather, foils, rubber, transparent wrappings, or art and glossy paper. Non-dusting and waterproof, it is removed from paper with a pencil eraser and from other surfaces with a damp cloth.

People in the NEWS

● DR. J. W. F. MCOMIE has been promoted by the council of Bristol University to a readership in organic chemistry. MR. J. CLUTTON-BROCK has been appointed lecturer in anaesthetics and head of the department of anaesthetics.

● DR. NYMAN LEVIN, B.SC., PH.D., A.R.C.S., D.I.C., chief of research and development to Rank Precision Industries, has been appointed deputy director of the UK AEA Atomic Weapons Research Establishment, Aldermaston. Dr. Levin was responsible for the development in the UK of Xerography, a US technique of dry electrostatic photocopying and its applications, including the high speed printing of computer outputs.

Superintendent of the Admiralty Gunnery Establishment from 1951 to 1955 he was before then the head of the instrumentation group at the Admiralty Research Laboratory.

● DR. JOSEPH H. BRANT, who has been appointed director of corporate research of the Colgate-Palmolive Co. New York, US, was director of research of the Toni Co. from 1950 to 1957, and more recently was co-ordinator of research at the Harris Research Laboratories.

● DR. W. H. MILLER, technical director, agricultural products, of Cyanamid International, visted Britain last week to meet scientists working on antibiotic preservation of food under UK conditions. He is now attending an international conference in Paris to discuss this subject.

● MR. A. C. BROWN, formerly chief engineer of Birwelco Ltd., Chester Street, Aston, Birmingham, has become deputy general manager and general sales manager of that company. MR. G. E. CORBETT replaces Mr. Brown as chief engineer. Other Birwelco appointments made at the same time are: MR. J. MILLWARD, as technical manager, furnace division; MR. V. D. DAFT, as project manager to deal with sales estimating and tendering.

● MR. H. B. LOCKE, formerly of the Chief Scientist's Division, Ministry of Power, has joined the carbonisation department of the National Coal Board, in the development and planning branch.

● SIR HUGH BEAVER, chairman of the Government committee that has seen its recommendations embodied in the new Clean Air Act, has accepted an invitation for nomination as the next president of the National Society for Clean Air, to succeed DR. R. LESSING, C.B.E., whose two years' term of office ends in October.

● DR. J. A. POPLE has been appointed superintendent of the newly-created basic physics division at the National Physical Laboratory. Dr. Pople, who was born in 1925, worked as a research student at Cambridge with a D.S.I.R. award under the late SIR JOHN LENNARD-JONES. He was awarded a Smith's prize in 1950 and elected a Fellow of Trinity College in 1951. Since 1954 he has been a mathematics lecturer at Cambridge, and this year received the Marlow Medal of the Faraday Society. Dr. Pople has made theoretical contributions to a number of branches of molecular physics.

● An honorary M.Sc. has been conferred by the University of Manchester on MR. C. W. MAPLETHORPE, managing director of Allen and Hanbury's Ltd., who has been a member of the council of the Pharmaceutical Society of Great Britain since 1943, and chairman of its educational committee since 1945.

● Former head of New Zealand's Scientific and Industrial Research Department, SIR ERNEST MARSDEN is included in the newly appointed New Zealand Atomic Energy Committee. Also on the Committee whose chairman is DR. W. HARMAN, is DR. J. S. WATT of the Council of Scientific and Industrial Research.

● MR. P. H. D. RYDER has been appointed chairman of QVF Glastechnik GmbH, the German subsidiary of QVF Ltd., Fenton, Stoke-on-Trent. Mr. Ryder is already managing director of Thomas Tilling Ltd. and chairman of James A. Jobling and Co., Ltd.

● MR. L. DOBSON has been appointed engineering director of the plastics division of ICI. Previously Mr. Dobson has worked in the engineering department of the alkali division (he was the first maintenance engineer of the Winnington polythene plant and later polythene dirctor), but joined the plastics division this year as engineering director designate.

● MR. R. D. CAMERON, financial director of Joseph Crosfield and Sons Ltd., and William Gossage and Sons Ltd., has resigned from the boards of both companies on being transferred to the personnel division of Unilever Ltd. His successor is MR. WILLIAM RIGBY, who since 1956 has been chairman of Lever Brothers Ltd., in Pakistan. Mr. Rigby joined the Unilever organisation at Port Sunlight in 1922.

● MR. EDGAR WASTELL, general manager of the citric acid plant of John and E. Sturge Ltd., Denison Road, Selby, has retired at the age of 65 after an association with the firm lasting 47 years. Mr. Wastell, who began his connection with the firm in 1911 as a laboratory assistant, took over the newly created post of general manager at the Selby works in 1953. Also since its inception in 1953, he has been a member of the regional productivity committee of the Association of British Chemical Manufacturers.

Ciba UK Set Up Fellowships Trust

AT the opening on Wednesday of a new extension at Ciba Laboratories Ltd., chairman of the Ciba group of companies in Great Britain, Sir Arthur Vere Harvey, announced the foundation of the Ciba Fellowship Trust. Principal object of the Trust is to establish Ciba Fellowships to be awarded to graduates or undergraduates of the UK and Eire to carry out research or study at continental universities or institutions in chemistry, physics, or some other scientific subject.

The Trust will provide for 10 to 12 fellowships a year. Trustees are Sir Arthur, Lord Hives, and Professor Sir Alexander Todd. Professors A. J. Birch, W. Bradley, D. H. Everett and D. M. Newitt have consented to serve on the advisory panel. The Trust hopes to begin its activities in 1959.

The new extension was opened by the Minister of Health, the Rt. Hon. Derek Walker-Smith, who started the tabletting of a new anti-leprosy drug, Ciba 1906, which is being manufactured at Ciba's Grimsby factory.

ICI Work Study Team for West Indies

Three senior members of the ICI central work study department who this month are travelling to Jamaica and Trinidad to talk to top management executives there: Dr. Russell Currie, C.B.E., head of the department, with, left, J. B. Kitchin and, right, P. J. Torrie **(see p. 108).**

Commercial News

- **Doubled Net Profit for British Tar**
- **W. J. Bush Report Increase in Profits**
- **Milton Purchase Offer Under Discussion**
- **Negretti Interim Unchanged at 4 per cent**

British Tar Products

Trading profits and investment income of British Tar Products Ltd. for the year ended 31 March 1958 rose sharply from £110,579 to £206,695 and the net profit from £38,293 to £119,178 after tax of £58,989 (£50,973).

A final dividend of 17½ per cent. is announced which makes a total of 27½ per cent., against 25 per cent., less tax, and in addition the 5 per cent. tax-free capital distribution is being repeated.

The company announce that they are raising the distribution of 2½ per cent for the year ended March last and that they have received Treasury consent to a one-for-one scrip issue to those registered on 31 July next.

W. J. Bush

Manufacturing chemists, distillers of essential oils, etc., W. J. Bush and Co., had an increase in trading profit from £661,688 to £873,151 and in the net profit from £243,777 to £313,971.

The company are increasing their total dividend by 2½ per cent for 1957. A final of 11 per cent makes 13 per cent on capital increased by a one-for-two scrip issue, against 16 per cent on the old capital.

IBE

Manufacturers of bitumen emulsions, etc., IBE Ltd., report a group profit for the year ended 31 March 1958, after all charges, including tax of £25,199 (£34,180). Tax paid is £19,930 (£39,537). The profit attributable to the holding company is £24,743 (£33,411). Dividend on ordinary shares is 10 per cent (same).

Milton Antiseptic

Milton Antiseptic announce that discussions are taking place which may result in an offer being made to purchase the 10s ordinary share in the company. A further announcement is expected shortly.

Negretti and Zambra

An unchanged interim of 4 per cent has been announced by Negretti and Zambra. Although a slight falling off in incoming orders was experienced in trading results to date there was an improvement on last year.

NEW COMPANIES

AEROSOL ASSOCIATED INDUSTRIES LTD. Cap. £100. Designers and manufacturers of and dealers in valves, valve components and allied products, particularly for pressure-tight containers and aerosol packages, etc. Solicitors: Slaughter and May, 18 Austin Friars, London EC2.

FOULDS AND JACKSON RESEARCH LABORATORIES LTD. Cap. £1,000. Chemical research etc. Directors: F. G. C. Jackson, S. F. Bell and H. Foulds. Reg. office: Estate Office, Glebe Ave., Ickenham.

SCALEMASTER LTD. Cap. £1,000. Manufacturers of and dealers in filtering and purifying apparatus and plant and water treating and softening, scale preventing and removing plant and materials. Directors: J. R. Williams and R. W. Hodges. Reg. office: 27 John Adam Street, London WC2.

NOXID PRODUCTS LTD. Cap. £100. Manufacturers of and dealers in chemicals, chemical products etc. Secretary: D. S. C. Dixon. Reg. office: 128 Crawford Street, London W.1

A. REVAI AND COMPANY (TRADING) LTD. Cap. £100. Importers and exporters of chemicals, solvents, plastics, essential oils, etc. Directors: P. C. Gondos, R. E. Spall. Reg. office: 7/8 Idol Lane, London EC3.

TRETOL (SCOTLAND) LTD. Private company. Capital £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in chemicals, gases, drugs, medicines, plaster of Paris etc. Registered office: 65 Renfield Street, Glasgow C1.

V.E.S. (PRESERVATION) LTD. Cap. £5,000 Pest controllers, pest destroyers and manufacturers of products for the control and the destruction of insects, rodents, etc. Directors are: C. Watt, G. R. Thomson and M. Watt. Reg. offices: 18 Golden Square, Aberdeen.

CHANGES OF NAME

Myosotis Ltd. chemical merchants, of 39 Park Street, London W1 have changed their name to Trustay Ltd.

BTS Chemical Importers and Distributors Ltd., 155 Fenchurch Street, EC3 have changed their name to BTS Chemicals Ltd.

Associated Chemicals Ltd., 2 The Green, Richmond, Surrey, have changed their name to Associated Chemical Companies (Sales) Ltd.

W. and J. George and Becker Ltd., chemical and physical apparatus manufacturers, of 285 Ealing Road, Alperton, Wembley, Middlesex have changed their name to Griffin and George (Sales) Ltd.

LONDON GAZETTE

Liquidator Appointed

FLOWMETER MANUFACTURING CO. LTD., reg. office, Imperial Works, Braganza Street, London, SE17. G. A. Raymond, 40 High Street, Chatham, appointed liquidator (with committee of inspection), on 11 June.

Computer for Glasgow Chemistry Department

The chemistry department of Glasgow University is to install a DEUCE digital computer this autumn and will be the first Scottish university to undertake work of this type. Initially the machine will be used on crystallography calculations, while the physics department will use it on atomic structure work. The computer will also be used for external courses for executives and technicians from firms planning to install their own equipment. The only other DEUCE machine in Scotland is being used by the DSIR at East Kilbride for calculations on heat subjects.

Market Reports

PRICES CONTINUE FIRM

LONDON There has been little change in conditions on the industrial chemicals market during the past week. The more encouraging outlook for industry which has recently developed has been offset by the approach of the seasonal holiday interruption, and home account buyers are unwilling to cover more than nearby requirements. Contract deliveries have been taken up regularly enough, and the flow of export enquiry has remained at about recent levels. The price position continues steady with a firm undertone. Coal-tar products are moving reasonably well for the period.

MANCHESTER Prices generally on the Manchester market for heavy chemicals during the past week have remained steady, but many users are still said to be limiting fresh commitments to shorter periods in the hope that the market may ease somewhat before long. Most of the alkalis and other leading lines are moving in fair quantities to home users and so far there has been no marked decline in the weight of export business, except in a relatively few sections. Fertilisers are still seasonally quiet, but most of the tar products are in fair request.

GLASGOW Apart from the rather quiet conditions prevailing in some sections of industry, business during the past week in the Scottish market was fairly active. Demands received covered a range of chemicals, and also quite a volume of varied enquiries were dealt with. The price position has shown little change, and has mostly remained on a firm basis. There is still considerable activity in agricultural chemicals—where the overseas market remains fairly steady.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London WC2, price 3s 3d including postage; annual subscription £3 2s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

AMENDED SPECIFICATIONS

Copies will be on sale 13 August or as soon as possible thereafter

Amines and processes for preparation. May & Baker, Ltd. **770 870**

Copies will be on sale 20 August or as soon as possible thereafter.

Porous materials from thermoplastic high molecular weight addition polymers. Badische Anilin- & Soda-Fabrik. **695 826**

Styrene-isobutylene type copolymers. Esso Research & Engineering Co. **775 936**

ACCEPTANCES

Open to public inspection 13 August

Extrudable polyethylene. General Electric Co. **799 386**

Polymerisation of chloroprene. Du Pont de Nemours & Co., E. I. **799 474**

Weathering of iso-olefinvinyl aromatic copolymers. Esso Research & Engineering Co. **799 475**

Process of preparing substantially pure terephthalic and isophthalic acids. Olin Mathieson Chemical Corp. **799 181**

Combined flotation and clarification device. Dorr-Oliver, Inc. **799 297**

Purification of pentaerythritol. Hercules Powder Co. **799 182**

Apparatus for use in liquid storage. British Petroleum Co., Ltd., and Champagnat, A. **799 257**

Production of intermediates for the synthesis of reserpine and related compounds. Research Corp. **799 269**

Foundry moulding compositions comprising pre-coated fluid coke. Esso Research & Engineering Co. [Addition to 798 249.] **799 331**

Fungicides. Farbenfabriken Bayer AG. **799 320**

Dehydrocortical hormones. Upjohn Co. [Divided out of 799 493.] [Addition to 761 526.] **799 494**

Production of intermediate for the synthesis of reserpine and allied compounds. Research Corp. [Divided out of 799 269.] **799 270 799 271**

Production of intermediates for the synthesis of reserpine and analogous compounds. Research Corp. [Divided out of 799 269.] **799 272**

Preparation of acridine compounds. Parke, Davis & Co. [Divided out of 799 361.] **799 366**

Open to public inspection 20 August

Preservation of rubber latex. British Rubber Producers' Research Assoc. (Rubber Research Inst. of Malaya). **800 089**

Granulation of iron. Stewarts & Lloyds, Ltd. **800 070**

Production of baker's yeast. Distillers Co., Ltd. [Cognate application 33333.] **800 030**

Purifying polyolefins. Petrochemicals, Ltd. **800 142**

Polymeric emulsifying and suspending agents. Goodrich Co., B. F. **800 011**

Process for the electrolytic production of indium of high purity. Rare Metals Foundation. **800 153**

Electrolysis of fused salt, particularly alumina. Montecatini Soc. Generale Per L'Industria Mineraria E Chimica, and Varda, G. De. **800 092**

Deposition of metals and like substances on webs by evaporation in vacuo. Kunsch, W. **800 093**

Granular products. Fisons, Ltd. **800 208**

Gaseous supply equipment. Kidde Co., Ltd., W. **800 210**

Forgeable high strength austenitic alloy steel with molybdenum, tantalum or niobium-tantalum, and nitrogen additions. Babcock & Wilcox, Ltd. **800 225**

Glassware. Mendip (Chemical Engineering), Ltd. **800 095**

Apparatus for dispensing fluids. Imperial Chemical Industries, Ltd. **800 212**

Manufacture of hermetically sealed glass vessels containing gas under pressure. General Electric Co., Ltd., Bowtell, J. N., and Moore, J. A. **800 193**

Bonding of polyvinyl chloride to textile materials. Imperial Chemical Industries, Ltd., Knowles, E., and Meyrick, T. J. **800 097**

Device for carrying out liquid gas phase oxidations with oxygen-containing gases. Perfogit Soc. Per Azioni. **800 276**

Hydrogenation of carbon monoxide. Ruhrchemie AG., and Lurgi Gesellschaft Fuer Waermetechnik. **800 213**

Plastic materials having a cellulose triacetate basis. Soc. Rhodiatoce Soc. Per Azioni. **800 278**

Liquid proportioning device. McNair, H. N., and Dintino, A. L. **800 279**

Metallisable monoazo dyestuffs of the benzene-azo-quinoline series. Imperial Chemical Industries, Ltd. **800 144**

Metallisable monazo dyestuffs of the benzene-azo-8-hydroxyquinoline series. Imperial Chemical Industries, Ltd. **800 145**

Two-liquid layer salt conversion process. Callery Chemical Co. **800 099**

Fire-resistant polyesters. Farbenfabriken Bayer AG. **800 215**

Distillation of organic acid mixtures. Distillers Co., Ltd. **800 214**

Retorts for the manufacture of zinc white. Dudek, G. **800 104**

Pressure-liquid operated apparatus. Gullick, Ltd., and Seaman, M. E., [Personal representative of Seaman, T. [deceased]]. **800 077**

Preparing halogenated aryl silanes. Midland Silicones, Ltd. **800 280**

Preparing derivatives from usnic acid. Lääke Oy. **800 114**

Treating regenerated cellulosic articles to prevent discolouration. American Viscose Corp. **800 199**

Dense liquid separating apparatus. Jaruza AG. Chur. **800 116**

Photographic silver halide emulsions containing optical-sensitising dyes. Kodak, Ltd. **800 117**

Division of thermoplastic bodies. Lonza Electric & Chemical Works, Ltd. **800 118**

Production of hydrocyanic acid from formamide. Deutsche Gold- Und Silber-Scheideanstalt Vorm Roessler. **800 158**

Polyoxyalkylene surface active compounds. Wyandotte Chemicals Corporation. [Addition to 731 603.] **800 159**

Radiation-sensitive elements. Du Pont de Nemours & Co., E. I. **800 119**

Vanadium alloys. Armour Research Foundation of Illinois Institute of Technology. **800 120**

Recovering acid from waste acid liquors. National Lead Co. **800 052**

Hollow articles from, or the coating of articles with, polyvinyl chloride containing softener. Chemische Werke Hüls AG. **800 122**

Protective coatings. Lechler, P., and Lechler, K., [trading as Lechler, P. [Firm of]]. **800 282**

Methods of preparing emulsions. Esso Research & Engineering Co. **800 161**

Candle filters. Courtaulds, Ltd. **800 162**

Oxide materials for permanent magnets. Licentia Patent-Verwaltungs-GmbH. **800 242**

Compounds of the pyrimidine series. Badische Anilin- & Soda-Fabrik AG. **800 006**

Method of and apparatus for producing liquefied gas from gas stored under pressure. British Oxygen Co., Ltd. **800 267**

Treatment of platinum-containing catalyst. Houdry Process Corp. **800 126**

Producing anhydrous zirconium salts of organic monocarboxylic acids. Goldschmidt AG., T. **800 160**

Dyeing of polyester fibres. Sandoz, Ltd. **800 200**

Method and apparatus for treating products resulting from the action of nitric acid and other nitric mixtures on organic substances. Centre National de La Recherche Scientifique. **800 164**

Fuel compositions. Esso Research & Engineering Co. **800 283**

Electrowinning of metals. Dow Chemical Co. **800 284**

Coating method. Clevite Corp. **800 127**

Methods of preparing aldehyde polycondensates, Skanska Attikfabriken Aktiebolag. **800 201**

Vacuum treatment of molten metals. Scientific Research Institute, Ltd. **800 177**

Explosives. Chemotherm GmbH. **800 167**

Merocyanine dyes, processes for making them and photographic silver halide emulsions containing them. Kodak, Ltd. **800 244**

Vulcanisation of butyl rubber. United States Rubber Co. **800 294**

Hydrocarbontin isodithiocarbamates. Metal & Thermit Corp. **800 168**

Halogen-containing synthetic resins stabilised by hydrocarbontin dithiocarbamates. Metal & Thermit Corp. **800 295**

Method of and apparatus for purifying high pressure steam. Babcock & Wilcox, Ltd. **800 189**

Selective hydrogenation of 3, 6-oxy-3, 6-dihydrophthalic acid esters. Olin Mathieson Chemical Corp. **800 287**

Manufacture of alkyl hydrazines. Olin Mathieson Chemical Corp. **800 248**

Junction-containing silicon crystals. Texas Instruments, Inc. **800 296**

Production of cycloheximide by fermentation. Upjohn Co. **800 170**

Method and apparatus for maintaining efficiency of vacuum insulation. Union Carbide Corp. **800 204**

Decarburising high carbon ferrochromium. Union Carbide Corp. **800 205**

Isolating substantially pure dextran from fermentation products and the degradation thereof. Commonwealth Engineering Co. of Ohio. **800 288**

Separating diacetylene from acetone by distillation. Union Carbide Corp. **800 206**

Production of choline theophyllinate. Orgamol Soc. Anon. **800 171**

Detergent compositions. Unilever, Ltd. **800 291**

O-(3, 4-dichlorophenyl) N, N[1]-dialkyl phosphorodiamidothioates. Dow Chemical Co. **800 220**

Pumps for liquid carbon dioxide. Distillers Co., Ltd. [Addition to 760 241.] **800 068**

TRADE NOTES

New Laboratory Chemicals

The latest list of over 600 laboratory chemicals and reagents issued by May and Baker Ltd., of Dagenham, Essex, includes a large proportion of substances which have never previously been produced to specified standards of purity. There are four new sections covering research chemicals, laboratory chemicals for gas chromatography, indicators and organic analytical reagent chemicals.

PVC Paste

A range of p.v.c. pastes known as Plastisols has been developed by Dunlop Compositions Division, Chester Road, Erdington, Birmingham 24, for a wide variety of industrial applications. These pastes are basically dispersions of fine p.v.c. powder in a liquid plasticiser, which under the influence of heat gel and solidify to a rubbery solid. Suggested uses include coated paper manufacture, and as a seal for spot welded metal seams.

Feldalat 'NM'

Sole distributors for Britain of Feldalat NM (sodium methoxide) and other alcoholates produced by Feldmuhle AG., of W. Germany, are Tar Residuals Ltd., Plantation House, Mincing Lane, London EC3. It is stated that Feldalat NM has a $NaOCH_3$ content of about 98.5 per cent to 99.5 per cent; impurities are caustic soda and methanol, as well as traces of heavy metals. It is said to be readily soluble in alcohols and insoluble in hydrocarbons and ethers. Applications suggested for this material are numerous. Some of those mentioned are: as a condensation agent and catalyst for many chemical reactions; as an auxiliary in the manufacture of synthetic resins, etc., and dyes; as an intermediate in the manufacture of vitamins, barbiturates and essential oils.

Gilbarco Tank Gauge

The Gilbarco electronic tank contents gauge which records the level of any liquid to $\frac{1}{16}$ in. is to be manufactured in Britain by Firth Cleveland Instruments Ltd. (a subsidiary of Simmonds Aerocessories Ltd.) of Treforest Industrial Estate, Glamorgan, under licence from the Gilbert and Barker Manufacturing Co., of West Springfield, Massachusetts, US.

Heat-Sealable Mylar

Three new grades of Mylar polyester film which can be heat sealed by normal methods and one which is heat shrinkable are announced by the US Dupont organisation, and are immediately available in this country from their agents, Durham Raw Materials Ltd., 1/4 Great Tower Street, London EC3.

The new grades of Mylar are coated either on both sides or one side only to ensure heat sealing by normal equipment. All supplied in a nominal thickness of ½ thou, they are: Mylar 50K.22, coated on both sides and recommended for bag manufacture; Mylar 50K.23, coated on both sides and recommended for overwraps and bundling; Mylar 50K.24, coated on one side only and suggested for laminations or extrusion coatings for vacuum packaging or 'gassed' packaging.

Nomogram of NRP Products

A nomogram of their petroleum jellies, white mineral oils, microcrystalline waxes, transformer and turbine-oils, metal working oils, sulphonates, anti-corrosion oils and petrolatums, water-displacing products, and oil additives, has been published in English by the Nederlandse Raffinaderij van Petroleumproducten, Haarlem. Copies are obtainable from the refiners' sole UK selling agents, Arthur Brown and Co. Ltd., Bevis Marks House, Bevis Marks, London EC3.

Potassium Nitrate

Tar Residuals Ltd., Plantation House, Mincing Lane, London EC3, have been appointed sole distributors in Great Britain for the potassium nitrate manufactured by Societa Bario e Derivati of Milan.

Chemico To Move

As from 21 July Chemical Construction (Great Britain) Ltd., Bush House, London WC2, are moving to new, larger premises at Henrietta House, 9 Henrietta Place, London W1 (Langham 6571).

Fine Dust Mask

The Draeger Semi-Mask 74/545, marketed by Panorama Equipment Ltd., has been tested and given the official approval of HM Inspector of Factories.

Filters for maximum protection against solvents and organic vapours (paint spraying), acid gases, sulphur dioxide and ammonia can be supplied.

Murex Tantalum Prices

In CHEMICAL AGE, 28 June (p. 1200), it was stated that Murex Ltd. had reduced the price of their titanium products. Murex, however, are not manufacturers of titanium and the price reductions referred to are those for tantalum, which is produced by the company.

Plastics Progress is Slowing Down

BOARD OF TRADE figures for the first quarter of 1958 show that the rate of expansion of the plastics industry is slowing down. Sales of plastics materials at 103,400 tons were only 7 per cent higher than in the corresponding period last year.

Sales of thermoplastic materials at 59,900 tons were 12 per cent higher than in the first quarter of 1957, while those of thermosetting materials at 43,500 tons were practically the same as a year ago. Increases were recorded in the sales of polythene, alkyds and polyesters.

Exports of all plastics materials were up 9 per cent to 27,900 tons, while imports were 42 per cent higher at 10,100 tons.

Detailed figures in the following table were compiled from the records of over 150 manufacturers.

Net Sales of Plastics Materials
(Thousand Tons)

	1st Quarter 1957	1958
Thermosetting materials		
Alkyds	10.5	11.1
Aminoplastics	13.5	13.2
Phenolics and cresylics	16.9	16.6
Polyesters	0.7	1.1
Others (including casein)	1.6	1.5
Total thermosetting materials	43.2	43.5
Thermoplastics materials		
Cellulose	3.0	3.5
Polyvinyl chloride	15.4	18.4
Polystyrene	7.3	8.3
Others	27.6	29.7
Total thermoplastics materials	53.3	59.9
Total all plastics materials	96.5	103.4

Publications Received

The Collis Truck-Pallet Type and The Mota-Veyor: J. Collis and Sons Ltd., Regent Square, Gray's Inn Road, London WC1.

Quickfit Kjeldahl Apparatus: Quickfit and Quartz Ltd., Heart of Stone, Staffs.

Catalogue of Shell Films: The Shell Petroleum Co. Ltd., Public Relations Department, 1 Kingsway, London WC2.

Modern Laboratory Equipment: J. W. Towers and Co. Ltd., Widnes, Lancs.

Butyl; A General Purpose Synthetic Rubber: Esso Petroleum Co. Ltd., Chemical Department, 36 Queen Anne's Gate, London SW1.

NIFES Regular Service Agreements: National Industrial Fuel Efficiency Service, 71 Grosvenor Street, London W1.

DIARY DATES

MONDAY 21 JULY

DSIR International High Polymer Conference—Nottingham: Trent Building, University. Reception 8.30 p.m. Conference opens, Trent Building, 9.30 a.m. 22 July until 24 July.

"VULCAN" BRAND IRON AND STEEL CARBOY HAMPERS SAFETY CRATES, PACKED CARBOYS

HARRIS (LOSTOCK GRALAM) LTD.

LOSTOCK GRALAM, NORTHWICH, CHESHIRE.